THE

AMERICAN GAS-LIGHT JOURNAL.

THE OFFICIAL GAZETTE OF

LIGHT, HEAT, WATER-SUPPLY, AND SEWERAGE.

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GAS IN ENGLAND.

At Walsall the price of gas has been reduced to 2s. 10d. per thousand cubic feet, to consumers of less than 25,000 cubic feet per quarter. 2s. 8d. per thousand feet to consumers of 25,000 and less than 100,000 cubic feet per quarter, and 2s. 6d. per thousand feet to consumers of 100,000 cubic feet per quarter, and upwards. The street lamps in Walsall are supplied at the rate of 2s. 4d. per thousand cubic feet, or at £2 14s. 6d. per lamp per year.

Gas-works have been recently built at Brightlingsea. They were built at a cost of £2,000. The gas-holder will contain 9,000 cubic feet,

At Norwich, the directors of the British Gas-Light Company have voluntarily announced their intention to reduce the price of their gas, from the first of January, 1864, to 4s. per thousand cubic feet.

At Tralee, owing to alterations in connecting a new gas-holder, the consumers will be 10 nights without gas. We venture to say they will doubly appreciate it when it shall be again turned on.

At Manchester, the foundation-stone of the new retort-house of the Corporation Gas-works, at Gaythorn, has been laid by the Mayor (Mr. Abel Heywood), and at the luncheon, which was afterwards held at the Town Hall, Mr. Curtis, the chairman of the gas committee, stated that by Mr. Macfarlane's arrangement, as it would be carried out in the new works, they would be prepared to carbonize in each stack 4 tons 16 cwt. of Cannel, producing 48,000 cubic feet of gas, in 24 hours, with an expenditure of 15¼ cwts. of coke. Thus in the same space of building they would double the amount of their production, without increasing the cost of their expenditure for fuel. Whether they had arrived so far as they could go in these respects time alone will show, but he thought they had already accomplished a great deal. He found, by looking at the books that the consumption of gas on one day recently had been 3,233,000 cubic feet. He had calculated how many sperm candles would be needed to give the amount of light supplied by that quantity of gas, and he found it would be 3,960,00[illegible]. Mr. Rumney, in responding to the toast, "The Chairman of the Sub-Committees, and Success of the Building," said that one of the chief questions in connection with the extension of their gas-producing power was whether it was likely that there would ever be a cheaper artificial light? He thought there was no probability of such a thing at present. Experiments were made last winter by Dr. Frankland, an eminent chemist, now resident in London, and formerly of Owen's College, the result of which deserved to be widely known. He found that the illuminating power of 20 sperm candles for ten hours would cost as follows in the several artificial lights named:—Spermaceti candles, 6s. 8d.; paraffin candles, 3s. 10d.; tallow candles, 2s. 8d.; sperm oil, 1s. 10d.; paraffin oil, 6d.; coal gas, 4½d.; Cannel gas, 3d. Another consideration was that some persons complained of gas causing heat and impurity in the air, and it became a question whether it created more heat and impurity than other artificial lights. The same gentleman conducted experiments to find that out, with these results: Taking the illuminating power of 20 sperm candles as the standard, it was found that in a room of a certain size, and in a given time, tallow candles produced 10 cubic feet of carbonic acid gas, and an amount of heat represented by 100; spermaceti candles produced 8.3 cubic feet of carbonic acid gas, and heat, 82; paraffin candles, 6.7 cubic feet of carbonic acid gas, and heat 66; coal gas, 5 cubic feet of carbonic acid gas, and heat 47; and Cannel gas, 4 cubic feet of carbonic acid gas, and heat 32. This disposed of the idea that gas caused more heat, and made the atmosphere more impure, than other artificial lights.

PRESERVATION OF BUILDING MATERIALS BY THE RESIDUUM OF COAL TAR.

In France the residuum obtained by the distillation of tar, for the purpose of extracting the oils and hydrocarbons is called *brai* (*coal-tar pitch* in English). Upon immersing bricks in this resin, melted at 200°, they become fit to use with success in the construction of Chlorine chambers, also for condensers for chlorhydric acid. Mr. Kuhlman, of Lille, has applied it hot to the exterior walls of his kilns for the decomposition of sea salt; he also impregnated with it the tiles with which his workshops are covered, especially on those in which acid exhalations are produced. He also employs it for giving consistency and a black color to vessels and tiles of porous earthenware. Plaster acquires a strong consistency, and does not crack as it does after being dipped in silicate of potash or soluble glass: by virtue of its porosity, it is thoroughly penetrated by the resiu, and becomes permeable to all other substances; while objects moulded in plaster retain their form without the least alteration. This is so true that crystals of gypsum (natural hydrated sulphate of lime) become, in the resin, of a shining black color, the crystalline form not being changed, but the water of hydration, being replaced by the resin: it is a pseudomorph. Alabaster acts in the same way.

Stones covered with coal tar, or even with greasy or resinous coating, resist the action of wind bringing salt-spray from the sea better than do bare stones.

Mr. Kuhlman saw a striking example of this in the Bay of Biscay upon a building erected in 1858. Upon the more exposed points, the wrought stones were deeply corroded; but what is more remarkable of those stones which before being put in place were numbered in black with oil, the parts covered by the color have been so protected from alteration that the numbers are now presented in considerable relief and with great sharpness.

This resin is not the only substance which readily penetrates plaster, stone or masonry. Mr. Kuhlman has discovered that resins, greasy matter, and various other substances act in the same way, and that it is also the case with all liquids and bodies in fusion, when they *wet* the body which is to be penetrated. In the case of plaster it is not a simple effect of permeability, but rather of displacement of the water; the plaster becoming anhydrous, is thoroughly penetrated by the tarry matter, and its consistence increases, but the form of the object moulded is preserved unaltered, even when the bath of resin is raised to the temperature of 400°C. At from 150° to 200°C., stearic acid acts like resin; the plaster becomes impregnated with it, and at the same time loses its water of hydration, which is recognized from the boiling which it occasions in the bath.

With liquids which do not wet the plaster, this penetration does not take place. Mr. Kuhlman has tried in vain to effect it with melted sulphur or with mercury.

But it is not only water which can be displaced by coal tar; other substances are similarly affected: e. g., crystallized peroxyd of manganese loses, in the boiling resin, one atom of its oxygen, and takes up coal tar; its crystalline form remains unchanged; after the operation, the cystals thus treated no longer give any trace of chlorine with chlorhydric acid.

In all these experiments, the temperature of the solid body should be raised very gradually.—*Silliman's Journal.*

CARBOLIC ACID.

This peculiar substance seems to have almost as many names as the Wandering Jew, and in defectively compiled chemical works, each name is set down as meaning a different substance. It received the above name from its discoverer, Runge, in 1834, and it is now also called phenic acid, phenol, phenic-alcohol, and the hydrate of phenyle. It may be obtained synthetically as well as analytically. The distinguished chemist, Bertholet, has made it by passing alcohol and acetic vapors through a porcelain tube heated to redness.

It is, however, commonly obtained from the oil of coal tar.

When this oil is submitted to fractional distillation, the part which passes over between 160 and 190 degrees of temperature, is treated with hot saturated caustic and some powdered potash, and a mass of crystals is obtained, which is separated by decantation. When these are dissolved in water the solution separates into two layers; the one light and oily, the other heavy and watery. The latter is separated and treated with hydrochloric acid, which sets free carbolic acid. To make it perfectly pure, however, it is digested with fused chloride of calcium, and re-distilled twice; when, upon cooling slowly, it forms in a solid colorless mass (C H12 O6 H O). It has an odor resembling creosote, and is sometimes sold for it; but the latter is a distinct substance.

Carbolic acid burns with a reddish flame, and boils at 180°. It is slightly soluble in water, but is very soluble in alcohol, ether, acetic acid, glycerine and some volatile oils. It acts very energetically upon the skin; a weak aqueous solution coagulates albumen, and acts as a strong antiseptic. Putrid meat, fish, and fermenting animal substances instantly lose their disgusting odor when treated with a solution of carbolic acid. It is employed, mixed with plaster-of-Paris, in disinfecting powders, as it arrests fermentation and destroys infection. Weak solutions of it instantly destroy the lowest forms of animal and vegetable life; and ink, solutions of glue, and the juices of vegetables are prevented from becoming mouldy by an addition of a very small quantity of it. A strong solution of it kills the eggs of ants, caterpillars and the larvae of flies. When applied lightly to the human skin, the latter smarts for about an hour, the epidermis becomes wrinkled, and remains red and somewhat inflamed for about twenty days. When a very minute quantity of it is taken into the stomach it seems to act upon the nerves, producing insensibility almost instantaneously.

ELIZABETH, N. J.—The gas-works of this city have been adapted to use Gwynne's patent water-gas process, which has been in successful operation in Scranton, Pa., for more than six months. Several eminent engineers who have visited the Scranton gas-works, unbelievers in water-gas, have, after thoroughly examining Gwynne's process, pronounced it to be all that the patentee represents it. The Scranton Company attest that it produces a gain of at least 25 per cent. of gas from ordinary caking coal, with an equal if not superior illuminating power to that produced by the old method. As Elizabeth City is very easy of access from New York, engineers desiring to examine the operation of the new process, will have every facility to do so, as trains run thither nearly every hour.

GAS-LIGHT COMPANIES IN THE UNITED STATES.

Compiled from official sources expressly for the AMERICAN GAS-LIGHT JOURNAL.

CORRECTED BY JOHN B. MURRAY, No. 39 NASSAU STREET, NEW YORK, DEALER IN GAS-LIGHT SHARES.

When Chartered.	Town.	State.	Chartered Capital.	Par Val. Per Sh. $	Semi-Ann'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS
1857	ADRIAN	Mich.	50,000	50	—	May & November.	4,000	3 50	....	....	
1856	AKRON	O.	20,000	33⅓	—	Do.	3,500	3 00	....	....	
1840	ALBANY	N. Y.	25 ,000	20	4	January & July.	65,000	3 00	120	....	None in market.
1858	ALBION	N. Y.	30,000	100	—	Do.	3,000	3 80	....	....	
1851	ALEXANDRIA	Va.	106,530	—	—	City Works.	9,000	3 50	....	....	
1852	ALLEGHANY	Pa.	200,000	25	4	May & November.	25,000	3 00	....	....	
1858	ALLENTOWN	Pa.	60,000	100	3½	Do.	5,000	3 50	....	....	
1857	ALTON	Ill.	75,000	—	—	Private Works.	4,000	3 50	....	....	
1859	ALTOONA	Pa.	40,000	20	4	January & July.	5,000	3 00	....	...	
1859	AMESBURY AND SALISBURY	Mass.	80,000	25	—	Do.	7,000	4 00	....	....	
1856	ANNAPOLIS	Md.	100,000	25	—	Do.	4,000	4 00	....	....	
1858	ANN ARBOR	Mich.	23,000	50	5	March & September.	5,500	4 00	....	....	
1858	ASTORIA	N. Y.	20,000	50	—	Do.	6,000	4 00	....	....	
1855	ATLANTA	Ga.	50,000	25	5	January & July.	12,000	5 00	....	....	
1857	ATTLEBORO'	Mass.	6,000	50	3	Do.	2,000	6 00	....	....	
1850	AUBURN	N. Y.	80,000	50	5	Do	10,000	7 00	....	....	
1851	AUGUSTA	Ga.	80,000	25	8	Do.	9,000	6 00	....	....	
1858	AUGUSTA AND HALLOWELL	Me.	84,700	50	5	Do.	10,000	4 00	....	....	{ Formerly used Sanders' Water-Gas. Recently altered to Coal Gas-Works.
1860	AURORA	Ind.	10,000	—	—	Private Works.	3 500	3 50	....	....	
1817	BALTIMORE	Md.	550,000	100	5	June & December.	150.000	2 50	150	....	None for sale.
1852	BANGOR	Me.	120,000	100	2½	January & July.	12.000	3 00	100	....	
1855	BATAVIA	N. Y.	32,000	20	4	Do.	2,500	4 00	100	100	Stock firm. Good works and well managed.
1858	BATH	Me.	65.000	100	3	April & October.	10,000	3 75	...	...	
1859	BATH	N. Y.	15,000	50	—	May & November.	8,000	7 00	....	....	
1861	BATTLE CREEK	Mich.	15,000	—	—	January & July.			....	....	
1858	BELFAST	Me.	14,000	100	—	Do.	7,000	7 00	....	....	
1856	BELLEFONT	Pa.	20,000	25	2	Do.	3,500	4 00	....	....	
	BELOIT	Wis.	30,000	—	—	Do.	4,000	4 00	....	....	
1854	BETHLEHEM	Pa.	50,000	50	4	June & December.	2,000	3 20	...	....	
1850	BEVERLY	Mass.	40,000	100	—	January & July.	4,000	4 00	....	....	
1856	BINGHAMPTON	N. Y.	50,000	50	3½	Do.	10 000	4 00	....	....	
1859	BIRMINGHAM	Pa.	40,000	50	—	Do.	4,000	4 00	....	....	
1855	BLOOMINGTON	Ill.	40,000	50	—	Do.	6,000	4 00	....	....	
1858	BORDENTOWN	N. J.	50,000	25	3	June & December.	4,000	3 80	....	....	
1822	BOSTON	Mass.	1,000,000	500	5	Do.	130,000	2 25	....	....	
1859	BRATTLEBORO'	Vt.	21 000	—	—	Do.	3,000	4 00	....	....	
1851	BRIDGEPORT	Ct.	90,000	25	4	January & July.	10,000	4 00	90	....	Passed last dividend.
1857	BRIDGETON	N. J.	50,000	20	—	Do.	5,000	4 00	....	....	
1856	BRISTOL	Pa.	80,000	25	3	February & August.	3,000	4 00	....	....	
1855	BRISTOL	R. I.	35,000	50	2	January & July.	6,000	4 00	....	....	
1859	BROCKPORT	N. Y.	25,000	100	3	Do.	1,500	4 00	....	....	
1858	BROOKLINE	Mass.	66,000	100	3½	February & August.	3,500	3 50	....	....	
1825	BROOKLYN	N. Y.	2,000,000	25	5	January & July.	75,000	2 50	170	160	
	BROWNSVILLE	Pa.				Do.			....	....	
1848	BUFFALO	N. Y.	600,000	50	5	Do.	70,000	2 90	140	125	
1852	BURLINGTON	N. J.	100.000	25	3½	Do.	5,000	4 00	105	....	
1853	BURLINGTON	Vt.	75,000	25	2½	Do.	10,000	4 50	....	....	
1859	BURLINGTON	Iowa.	65,000	50	—	Do.	8,000	4 00	....	....	
1861	CALAIS	Me.	90,000	100	—	Do.	10,000	3 50	....	...	
1852	CAMBRIDGE	Mass.	300,000	100	5	February & August.	20.000	3 50	100	97½	
1852	CAMDEN	N. J.	300,000	100	3	April & October.	15,000	3 85	105	100	
1856	CANANDAIGUA	N. Y.	50,000	50	—	January & July.	3,000	4 00	90	80	
1856	CANTON	O.	19,000	50	6	March & September.	6,000	3 00	....	....	
1858	CAPE ISLAND	N. J.	80,000	100	—	October.	10,000	6 00	....	...	{ Watering place.—These Works only run in summer.
1860	CARBONDALE	Pa.	16,000	25	—	March & September.	5,000	4 00	....	....	
1855	CARLISLE	Pa.	30,000	25	—	January & July.	4,000	4 00	..	...	
1856	CATASAUQUA	Pa.	15,000	25	5	May & November.	2,000	4 00	....	....	
1858	CATSKILL	N. Y.		—	—	Private Works.	3,000	3 60	....	....	Owned by G. T. Sutton.
1857	CHAMBERSBURG	Pa.	80,000	25	—	January & July.	3,000	4 00	....	....	
1846	CHARLESTON	S. C.	723,800	25	4	Do.	50,000	4 00	....	....	
1851	CHARLESTOWN	Mass.	200,000	50	4	Do.	30,000	3 00	105	. ..	
1858	CHARLOTTE	N. C.	14,000	50	10	March & September.	3,500	6 00	....	....	
1859	CHARLOTTEVILLE	Vt.	15,000	25	—	Do.	4,000	4 50	....	...	
1851	CHELSEA	Mass.	160.000	100	3½	January & July.	8,000	3 50	....	....	
1856	CHESTER	Pa.	35,000	25	3	April & October.	4,000	4 00	....	....	
1849	CHICAGO	Ill.	1,800,000	25	5	January & July.	100,000	2 50	150	140	Very scarce. Stock wanted.
1857	CHICOPEE	Mass.	50,000	20	—	Do.		4 00	....	....	
1851	CHILLICOTHE	O.	40,000	25	4	Do.	12,000	3 50	....	....	
1841	CINCINNATI	O.	1,600,000	100	5	Do.	225,000	2 50	....	....	
1859	CITIZENS', BROOKLYN	N. Y.	1,000,000	20	—	Do.	185,000	3 00	128	125	
1860	CITIZENS', READING	Mass.	90,000	100	—				....	....	
	CLARKESVILLE	Tenn.	100,000	50	—	Do.	5,000	4 00	....	....	
1860	CLAREMONT	N. H.	20 000	100	—	March & September.	3,000	4 00	....	....	
1846	CLEVELAND	O.	200,000	10	5	January & July.	20,000	3 00	....	....	
1858	CLINTON	Mass.	30,000	500	5	Do.	3,000	4 00	....	...	
1859	CLYDE	N. Y.	10,000	50	4	Do.	2,500	4 00	...	....	
1854	COHOES	N. Y.	50,000	20	2½	April & October.	5,000	3 60	...	....	
1860	COLD SPRING	N. Y.	30,000	50	—	Do.	3,500	4 00	95	....	{ Formerly Rosin-Gas, but now Coal. A well managed company. Stock firmly held.
1860	COLD WATER	Mich.	25,000	50	5	January & July.	4,000	4 00	....	....	
1852	COLUMBIA	Pa.	37,500	25	—	Do.	4,000	3 50	....	....	
1852	COLUMBIA	S. C.	44,000	25	4	Do.	6,000	6 00	....	....	
1857	COLUMBIA	Cal.	50,000	25	—	Do.	4,500	10 00	....	....	
1858	COLUMBUS	Ga.	54,000	25	5	Do.	5,000	7 00	....	....	
1850	COLUMBUS	O.	100,000	10	6	Do.	20.000	3 00	....	....	
1858	CONCORD	N. H.	50,000	50	5	Do.	8,000	3 50	....	....	
1853	COVINGTON AND NEWPORT	Ky.	100,000	50	3½	Do.	28,000	4 00	...	....	
1854	CUMBERLAND	Md.	60,000	50	3	Do.	6,000	4 00	....	....	
1857	DANBURY	Ct.	50,000	25	4	Do.	2,000	3 75	....	...	
1856	DANVILLE	Pa.	30,000	25	—	June & December.	3 000	4 00	....	....	
1855	DAVENPORT	Iowa.	56,000	100	—	Do.	6,000	5 00	....	....	
1848	DAYTON	O.	50,000	25	5	February & August.	8,000	3 50	....	.. .	
1858	DEDHAM	Mass.	40.000	50	—	January & July.	3,000	4 00	....	....	
1860	DELAWARE	O.	30,000	25	—	Do.	2,500	3 00	....	....	
1849	DETROIT	Mich.	500,000	50	5	Do.	30,000	3 50	160	150	Excellent Stock. No sales.
1860	DOBBS' FERRY	N. Y.	25,000	—	—	Do.	3,000	4 00	....	....	
1854	DORCHESTER	Mass.	150,000	100	—	Do.	14,000	4 00	....	....	
1859	DOVER	Del.	12,000	—	—	Private Works.	2,000	4 00	....	....	
	DOVER	N. H.				January & July.			....	....	
1857	DOYLESTOWN	Pa.	50,000	—	—	Do.	3,000	4 00	....	....	
1854	DUBUQUE	Iowa.	50,000	115	8½	Do.	17,000	4 50	....	115	This stock is wanted at par.
1853	EAST BOSTON	Mass.	133,000	25	4	Do.	20,000	3 50	....	145	No transactions.
1856	EAST GREENWICH	R. I.	11,200	100	15	Do.	3,000	7 00	....	....	
1861	EAST HAMPTON	Mass.	10,000	25	—	Do.	5,000	9 00	....	....	
1861	EAST NEW YORK	N. Y.	50,000	50	—	Do.	12,000	3 50	....	....	
1857	EASTON	Md.	9,000	10	—	Do.	1,500	7 00	....	....	
1850	EASTON	Pa.	125,000	50	4	June & December.	6,000	3 60	....	....	
1856	EASTPORT	Me.	50,000	55	—	Do.	3,000	4 00	....	....	
1855	ELIZABETH	N. J.	100,000	20	4	January & July.	14,000	3 50	....	....	
	ELLICOTT'S MILLS	Md.	10,000	—	—	Do.	4,000	4 00	....	....	
1852	ELMIRA	N. Y.	50,000	25	3½	Do.	5,000	4 00	....	...	
1852	ERIE	Pa.	68,000	50	3½	June & December.	10,000	3 00	....	....	
1853	EVANSVILLE	Ind.	60,000	50	4	January & July.	12,000	4 00	110	....	
	EXETER	N. H.	60,000	—	—	Do.	12,000	.. ..	....	...	A very good Company.
	FAIR HAVEN	Ct.	20,000	25		Do.	8,000	4 00	....	....	
1847	FALL RIVER	Mass.	26,000	—	—	Private Works.	12,000	3 50	....	....	
1859	FAYETTEVILLE	N. C.	25,000	100	6	January & July.	7,000	6 00	....	....	
	FIFTH WARD (Milwaukee)	Wis.	50,000	25	—	Do.	10,000	4 00	....	....	
1857	FISHKILL	N. Y.	10,000	20	—	April & October.	1,500	9 00	....	....	Make Petroleum-Gas.
1853	FITCHBURG	Mass.	100,000	50	3	January & July.	5,000	4 00	....	....	
1859	FLEMINGTON	N. J.	20,000	—	—	Do.	3,000	4 00	....	....	
1855	FLUSHING	N. Y.	20,000	50	1½	March & September.	6,500	4 00	...	....	
1858	FOLSOM	Cal.							.. ..	....	
	FORT WAYNE	Ind.	40,000	25	—	Do.	6,000	4 00	....	....	
1851	FRANKFORT	Ky.	50,000	—	—	City Works.	5,500	4 50	...	....	
1851	FREDERICK CITY	Md.	36,000	100	—	January & July.	5,000	6 70	....	....	
1854	FREDERICKSBURG	Va.	72,500	50	5	Do.	4,500	4 00	....	....	
1858	FREDONIA (Natural Gas)	N. Y.	10,000	100	—	Do.	2,000	4 00	....	....	Unlimited supply of Natural Gas.
1856	FREEPORT	Ill.	20,000	100	—	May & November.	10,000	4 00	....	....	

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When Chartered.	Town.	State.	Chartered Capital.	Par Val. Per Sh. $	Semi-Ann'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
1850	FREMONT	O.	25,000	25	—	May & November.	2,000	4 50	....	....	
1838	FULTON	N. Y.	12,000	100	—	Do.	4,000	7 00	....	....	
1855	GALENA	Ill.	70,000	100	—	Do.	8,000	4 00	....	....	
1859	GALION	O.	25,000	25	—	January & July.	1,800	3 00	....	....	
1858	GALVESTON	Texas.	150,000	50	—	May & November.	7,000	6 00	....	....	
1854	GARDINER	Me.	100,000	50	4	Do.	8,000	4 00	....	....	
1853	GENEVA	N. Y.	75,000	25	2½	Do.	6,000	4 00	....	....	
1851	GERMANTOWN	Pa.	Merged	into	the	Philadelphia Works.	12,000	2 25	....	....	
1859	GETTYSBURG	Pa.	20,000	50	3	January & July.	2,500	4 00	....	....	
1854	GLENN'S FALLS	N. Y.	35,000	50	3	February & August.	4,000	4 00	....	....	
1854	GLOUCESTER	Mass.	40,000	50	—	January & July.	5,000	3 50	....	....	
1857	GLOVERSVILLE	N. Y.	15,000	25	—	Do.	3,000	3 50	....	....	
1858	GRAND RAPIDS	Mich.	150,000	20	—	Do.	3,000	4 00	....	....	
1855	GREAT BARRINGTON	Mass.	5,000	100	5	April & October.	2,000	7 00	....	....	
1849	GREAT FALLS	N. H.	50,000	100	3	Do.	3,000	4 00	....	....	
1860	GREENFIELD	Mass.	20,000	50	2	January & July.	2,500	4 00	....	....	Close corporation.
1853	GREENPOINT	N. Y.	100,000	50	5	Do.	20,000	3 00	....	....	
1859	GREENSBORO'	N. C.	12,000	50	—	April & October.	3,000	7 00	....	....	
1858	GREENSBURG	Pa.	30,000	25	3	May & November.	2,000	3 00	....	....	
1854	HAGERSTOWN	Md.	15,000	20	—	January & July.	2,000	6 00	....	....	
	HAMILTON	O.	15,000			Do.			....	....	
1850	HANNIBAL	Mo.	100,000	100	—	Do.	6,000	3 50	....	....	
1857	HARLEM	N. Y.	350,000	50	3½	Do.	25,000	3 00	....	145	
1855	HARRISBURG	Pa.	100,000	—	4	Do.	5,000	4 00	...	....	
1849	HARTFORD	Ct.	200,000	25	4	Do.	25,000	3 00	150	140	Stock in demand.
	HASTINGS	N. Y.				Do.	8,000	4 00	...	....	
1853	HAVERHILL	Mass.	50,000	50	—	Do.	5,000	4 00	....	....	
1859	HAVERSTRAW	N. Y.	20,000	100	—	Do.	5,000	4 00	....	....	
1861	HAYESVILLE	Mass.	15,000	25		Do.	4,000	4 00	....	....	
1859	HEMPSTEAD	N. Y.	16,000	25	—	Do.	1,000	4 00	....	....	
1862	HOBOKEN	N. J.	100,000	25	3	Do.	30,000	2 50	....	100	Works not yet built.
1856	HOLLIDAYSBURG	Pa.	30,000	25	2	Do.	4,000	3 50	....	....	
1861	HOLYOKE	Mass.	20,000	25	—	Do.	3,000	4 00	....	....	
1861	HOMER & CORTLANDT	N. Y.	40,000	100	—	Do.	6,000	4 00	....	....	
1854	HONESDALE	Pa.	30,000	25	3	Do.	2,500	4 00	...	....	
1860	HORNELLSVILLE	N. Y.	12,000	50	—	Do.	2,000	4 00	....	....	
1858	HUDSON	N. Y.	50,000	100	3½	February & August.	3,000	4 00	....	....	
	HUNTER'S POINT	N. Y.									
1857	HUNTINGTON	Pa.	18,000	50	3	Do.	2,000	3 50	....	....	
1856	HUNTSVILLE	Ala.	7,325	25	—	June & December.	2,000	5 00	....	....	
	INDIANAPOLIS	Ind.	150,000	—	—	Do.	15,000	5 00	....	....	
1857	IOWA CITY	Iowa.	40,000	50	—	February & August.	4,000	4 50	....	....	
1852	ITHACA	N. Y.	75,000	25	3½	January & July.	6,000	4 00	....	....	
1857	JACKSON	Mich.	25,000	50	5	Do.	6,000	3 50	....	....	
	JACKSON	Miss.	80,000	50	—	Do.	4,000	4 50	....	....	
	JACKSON	Cal.	50,000	30	—	Do.	4,000	10 00	....	....	
	JACKSONVILLE	Flor.	30,000	20	—	Do.	2,000	7 00	....	....	
	JACKSONVILLE	Ind.	50,000	50	—	Do.	4,000	5 00	....	....	
1858	JACKSONVILLE	Mo.	25,000	25	—	Do.	7,000	6 00	....	....	
1856	JAMAICA	N. Y.	20,000	—	4	Do.	6,000	4 00	....	....	
1853	JAMAICA PLAIN	Mass.	75,000	100	3½	Do.	3,000	3 50	....	....	
	JAMESTOWN	N. Y.	25,000	—	—	Do.	4,000	4 00	....	....	
1856	JANESVILLE	Wis.	50,000	100	—	Do.	12,000	4 00	....	....	
	JEFFERSONVILLE	Md.	30,000	25		Do.	4,000	4 00	....	....	
1853	JERSEY CITY	N. J.	300,000	—	5	Do.	30,000	3 00	150	....	No sales since formation of Hoboken Co.
1858	JERSEY SHORE	Pa.	15,000	25	—	Do.	2,000	3 70	....	....	
1856	JOHNSTOWN	Pa.	80,000	25	3	Do.	8,000	3 00	....	....	
1857	JOLIET	Ill.	300,000	100	—	June & December.	6,000	4 00	....	....	
1858	KALAMAZOO	Mich.	30,000	50	5	Do.	10,000	4 00	....	....	
1860	KEENE	N. H.	60,000	100	—	Do.	4,500	4 00	....	....	
1855	KEOKUK	Iowa.	100,000	100	—	January & July.	10,000	4 50	....	....	
1855	KINGSTON	Pa.	50,000	50	—	Do.	3,000	4 00	....	....	
1859	KITTANNING	Pa.	20,000	—	—	Doubtful.	5,000	4 00	....	....	Said to be a fraud.
1854	KNOXVILLE	Tenn.	68,000	—	—	April & October.	4,000	5 00	....	....	
1860	LACONIA	N. H.	20,000	100	—	Do.	4,000	6 00	....	....	
1859	LA CROSSE CITY	Wis.	100,000	50	—	June & December.	10,000	8 00	....	....	Petroleum and Wood Gas.
1854	LAFAYETTE	Ind.	60,000	50	4	January & July.	10,000	3 25	....	....	
1856	LAMBERTVILLE	N. J.	30,000	25	—	Do.	2,600	4 00	....	....	
1849	LANCASTER	Pa.	100,000	50	4	Do.	10,000	3 00	....	....	
1856	LANCASTER	O.	25,000	100	5	Do.	5,000	3 50	....	....	
1855	LANSINBURG	N. Y.	25,000	100	—	Private Works.	7,000	4 00	....	....	
1849	LAWRENCE	Mass.	200,000	100	4	February & August.	15,000	3 50	....	....	
1859	LEAVENWORTH	Kansas.	200,000	25	—	Private Works.	15,000	4 00	....	....	
1856	LEBANON	Pa.	26,000	50	—	February & August.	5,000	4 00	....	....	
1861	LE ROY	N. Y.	25,000	50	—	Do.	4,000	4 00	....	....	
1858	LEWISBURG	Pa.	20,000	100	—	January & July.	4,000	4 00	....	...	
1852	LEWISTON	Me.	100,000	100	3	Do	10,000	3 20	....	....	
1856	LEWISTOWN	Pa,	30,000	50	3	April & October.	3,000	3 10	....	....	
1853	LEXINGTON	Ky.	100,000	25	4	January & July.	5,000	4 00	....	....	
1858	LITTLE FALLS	N. Y.	112,000	25	—	Do.	3,500	7 00	....	....	
1861	LITTLE ROCK	Ark.	20,000	—	—	Do.	5,000	6 00	....	....	
1858	LOCKHAVEN	Pa.	28,000	—	—	Do.	3,000	4 00	....	....	
	LOCKPORT	N. Y.	100,000	50	—	Do.	4,000	4 00	...	....	
	LOGANSPORT	Ind.	40,000		5	April & October.	5,000	4 00	105		But $481,400 stock has been sold. This Company has a large contingent fund and undivided profit on hand.
1838	LOUISVILLE	Ky.	600,000	50	6	January & July.	80,000	2 50	125	....	
1849	LOWELL	Mass.	200,000	25	5	Do.	50,000	3 25	....	....	
1852	LYNCHBURG	Va.	70,000	25	5	Do.	6,000	3 80	....	....	
1852	LYNN	Mass.	55,000	50	4	Do.	20,000	4 00	....	....	
1859	LYONS	N. Y.	30,000	100	—	Do.	4,000	4 00	....	....	
1852	MACON	Ga.	75,160	25	6	Do.	5,000	5 00	....	....	
1851	MADISON	Ind.	160,000	25	3	Do.	10,100	3 50	....	....	
1855	MADISON	Wis.	100,000	25	—	Do.	5,000	5 00	....	....	
1854	MALDEN & MELROSE	Mass.	50,600	25	3	February & August.	5,000	4 00	....	....	
1852	MANAYUNK	Pa.	40,000	100	—	Do.	7,000	4 00	....	....	
1852	MANCHESTER	N. H.	100,000	100	5	January & July.	25,600	3 00	....	....	
1830	MANHATTAN (N. Y. City)	N. Y.	4,000,000	50	5	Do.	600,000	2 50	....	....	
	MANSFIELD	O.	25,000	—	—	Do.	10,000	4 00	....	....	
1854	MARBLEHEAD	Mass.	40,000	100	3	Do.	1,000	4 00	....	....	
	MARLBORO'	Mass.	20,000	—	—	Do.	8,000	4 00	....	....	
	MAUCH CHUNK	Pa.	50,000	50	—	Do.	7,000	4 00	....	....	
1857	MARIETTA	O.	50,000	50	—	Do.	7,000	4 00	....	...	Stock firm.
1860	MARION	O.	12,000	25	5	April & October.	1,500	18 55	....	....	
1858	MARYSVILLE	Cal.	50,000	100	—	January & July.	4,000	2 50	....	....	
1857	MASSILON	O.	20,000	25	—	Do.	5,000	3 00	....	....	
1855	MEADVILLE	Pa.	39,500	25	—	Do.	4,000	3 50	....	....	
	MEDINA	N. Y.	2,000	100	—	Do.	2,000	7 00	....	....	
1852	MEMPHIS	Tenn.	300,000	100	5	June & December.	12,000	3 50	....	....	
	MERIDEN	Ct.	20,000			Do.			....	....	
1859	METROPOLITAN (N. Y. City)	N. Y.	1,000,000	100	—	January & July.	200,000	2 50	....	....	
1859	MIDDLEBORO'	Mass.	15,000	—	—	Private Works.		6 00	....	....	
1853	MIDDLETOWN	Ct.	50,000	25	3	March & September.	5,000	3 80	....	....	Owned by G. T. Sutton.
	MIDDLETOWN	N. Y.		25	—	Private Works.	3,000	3 00	....	....	
	MILFORD	Mass.	20,000	—	—	Do.		4 00	....	....	
	MILLEDGEVILLE	Ga.	100,000	50	—	Do.		5 00	....	....	
	MILTON	Pa.	10,000			Do.			...	....	
1847	MILWAUKEE	Wis.	400,000	50	5	January & July.	24,000	3 50	150	....	
1852	MOBILE	Ala.	200,000	—	—	Do.	30,000	4 50	....	....	
1836	MONROE	Mich.	40,000	50	—	Do.	5,000	3 50	50	....	
1852	MONTGOMERY	Ala.	100,000	25	4	February & August.	7,000	6 00	....	....	
1856	MONTPELIER	Vt.	30,000	25	3	January & July.	5,000	4 50	....	....	
1859	MORRISANIA	N. Y.	30,000	50	—	Do.		4 00	....	....	
1859	MORRISTOWN	N. J.	18,000	50	—	Do.	3,500	4 00	....	....	
1854	MOUNT HOLLY	N. J.	16,650	25	3	April & October.	2,000	7 00	....	....	
	MOUNT VERNON	O.	50,000	100	—	Do.		4 00	....	....	
1857	MUSCATINE	Iowa.	50,000	100	—	January & July.	3,000	4 50	....	....	
1864	NANTUCKET	Mass.	50,000	100	3	February & August.	6,000	4 00	....	....	

GAS-LIGHT COMPANIES IN THE UNITED STATES.—Continued.

Compiled from official sources expressly for the AMERICAN GAS-LIGHT JOURNAL.

CORRECTED BY JOHN B. MURRAY, No. 39 NASSAU STREET, NEW YORK, DEALER IN GAS-LIGHT SHARES.

When Chartered.	Town.	State.	Chartered Capital.	Par Val. per Sh. $	Semi-Ann'l Div.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
1852	Nashua	N. H.	45,000	50	3½	January & July.	10,000	3 50	....	....	
1850	Nashville	Tenn.	200,000	50	5	Do.	25,000	3 50	....	....	
1858	Natchez	Miss.	46,000	50	—	Do.	20,000	5 00	....	....	
	Nevada City	Cal.							....	....	
1852	New Albany	Ind.	200,000	50	3½	Do.	16,000	3 50	....	....	
1846	Newark	N. J.	362,000	50	5	Do.	45,000	3 62	130	....	Always a favorite stock.
1856	Newark	O.	30,000	100	—	Do.	7,000	5 40	....	....	
1852	New Bedford	Mass.	180,000	100	5	Do.	15,000	2 90	102	....	Well managed and kept quiet.
1859	Newbern	N. C.	22,000	100	6	Do.	6,000	3 50	....	....	
	New Britain	Ct.	30,000	20	5	Do.	3,000	4 00	....	....	
1851	New Brunswick	N. J.	100,000	20	4	Do.	8,000	3 00	115	....	
1852	Newburg	N. Y.	67,000	20	4	Do.	10,000	4 00	105	....	
1852	Newburyport	Mass.	150,000	10	4	Do.	9,000	4 00	92½	....	
1857	Newcastle	Del.	82,300	10	3	Do.	4,000	4 00	90	....	
1847	New Haven	Ct.	250,000	25	4	Do.	30,000	3 00	155	....	None in market.
1858	New London	Ct.	70,000	50	3	Do.	12,000	4 00	105	....	
1835	New Orleans	La.	1,500,000	100	6	Do.	120,000	4 00	180	....	
1838	Newport	R. I.	130,200	100	4	Do.	10,000	3 50	112	....	
1854	Newton & Watertown	Mass.	300,000	100	2	Do.	10,000	4 00	....	....	
	Newton	N. J.	30,000	—	—	Do.	3,000	4 00	....	....	
	Newton	Pa.	20,000	50	—	Do.	2,500	4 00	....	....	
	Newtown	N. Y.									
1823	New York	N. Y.	1,000,000	50	5	May & November.	100,000	2 50	300	....	
1859	Niagara Falls	N. Y.	15,000	25	—	Do.	3,000	4 00	90	....	
	Norfolk	Va.	60,000	25	—	Do.	40,000	4 00	....	....	
1853	Norristown	Pa.	41,700	25	4	June & December.	8,000	3 50	....	....	
1855	North Attleboro'	Mass.	50,000	100	3½	Do.	6,000	4 00	....	....	
	Northern Liberties	Pa.	400,000	25	7	City Works.	40,000	2 50	....	....	
	North Adams	Mass.	25,000	—	—	March & September.	30,000	4 00	....	....	
1856	Northampton	Mass.	85,000	25	3	January & July.	4 500	4 00	....	....	
1859	North Bridgewater	Mass.	16,000	100	4	June & December.	1,000	7 00	....	....	
1856	Norwalk	Ct.	30,000	150	4	February & August.	6,000	4 00	....	....	
1859	Norwalk	O.	30,000	25	—	January & July.	4,000	4 00	....	....	
1854	Norwich	Ct.	75,000	25	3½	Do.	12,000	3 50	....	....	
1861	Norwich	N. Y.	12,000	50	—	Do.	2,500	4 00	....	....	
1859	Nyack	N Y.	20,000	100	—	Do.	2,500	4 00	....	....	
1860	Oberlin	O.	10,000	—	—	Do.	1,200	4 00	....	....	
1855	Ogdensburg	N. Y.	75,000	50	5	Do.	9,000	4 00	....	....	
1859	Orange	N. J.	65,000	25	—	Do.	6,000	3 50	....	....	
1852	Oswego	N. Y.	81,250	100	3½	Do.	15,000	4 00	105	....	Good works, built by Hoy, Jr., & Kennedy.
1855	Ottawa	Ill.	45,000	100	6½	Do.	6,000	4 00	....	....	
1856	Owego	N. Y.	40,000	50	3½	Do.	5,000	4 00	....	....	
1860	Owensboro'	Ky.	25,000	25	—	Do.	4,000	3 50	....	....	
1856	Paducah	Ky.	75,000	100	—	May & November.	4,000	5 00	....	....	
1861	Painsville	O.	40,000	25	5	Do.	2,500	5 00	....	....	
1856	Palmyra	N. Y.	12,000	25	—	January & July.	3,000	7 00	....	....	
1847	Paterson	N. J.	125,000	25	3	Do.	20,000	3 50	95	....	
1850	Pawtucket	R. I.	75,000	50	4	Do.	12 000	3 00	....	....	Surplus $10,000, May 15, 1863.
1855	Peekskill	N. Y.	31,000	50	3	June & December.	4,000	4 00	....	....	Works leased to Gilbert T. Sutton.
1860	Penn Yan	N. Y.	12,000	50	5	Do.	3,000	4 00	....	....	
1859	Peoples', Chicago	Ill.	500,000	50	New	Do.	100,000	2 50	....	....	What is this Company doing?
1855	Peoria	Ill.	100,000	50	4	Do.	8,000	3 50	....	....	
1852	Petersburg	Va.	120,000	—	5	January & July.	20,000	3 80	....	....	
1841	Philadelphia	Pa.	3,000,000	50	—	City Works.	650,000	2 50	....	....	
1855	Piqua	O.	50,000	50	—	January & July.	6,500	4 00	....	....	
1835	Pittsburg	Pa.	300,000	100	5	Do.	60,000	1 50	115	....	
1854	Pittsfield	Mass.	50,000	100	5	Do.	4,500	4 00	....	....	
1858	Placerville	Cal.	30,000	50	—	Do.	4,500	10 00	....	....	
1860	Plainfield	N. J.	25,000	50	—	Do.	2,500	4 00	....	....	
1859	Plattsburg	N. Y.	16,000	50	—	January & July.	5,000	7 00	....	....	
1858	Plymouth	Mass.	40,000	100	—	April & October.	8,000	4 00	....	....	
1860	Port Chester	N. Y.	50,000	50	—	Do.	4,000	4 00	....		
1860	Port Jervis	N. Y.	20,000	100	—	Do.	3,000	4 10	....	....	
1849	Portland	Me.	300,000	50	4	January & July.	30,000	3 00	....	....	
1859	Portland	Oreg.	50,000	50	—	Do.	3,500	8 00	....	....	
1859	Port Lavacca	Texas.	50,000	100	—	Do.	2,500	7 00	....	....	
1851	Portsmouth	N. H.	70,000	100	3	April & October.	6,500	3 70	....	....	
1855	Portsmouth	O.	50,000	50	4	January & July.	10,000	3 50	....	....	
1855	Portsmouth	Va.	100,000	50	4	Do.	4,000	4 00	....	....	
1856	Pottstown	Pa.	20,000	50	3	Do.	3,500	4 00	....	....	
1850	Pottsville	Pa.	110,000	50	2	Do.	10,000	3 50	....	....	
1850	Poughkeepsie	N. Y.	84,000	25	4	March & September.	15,000	3 50	120	110	
1848	Providence	R. I.	1,000,000	50	4	January & July.	60,000	3 00	122	....	
1858	Quincy	Ill.	300,000	50	4	June & December.	12,000	3 50	....	....	
	Quincy	Mass.	60,000	50	—	Do.	60,000	0 00	....	....	
1853	Racine	Wis.	43,500	26	—	Do.	7,000	3 50	....	....	
1857	Rahway	N. J.	50,000	20	—	January & July.	5,000	4 00	....	....	
1858	Raleigh	N. C.	25,000	100	6	May & Novrmber.	5,000	6 00	....	....	
1848	Reading	Pa.	100,000	25	4	January & July.	25,000	3 00	....	....	
1851	Richmond	Va.	341.975	—	—	City Works.	30,000	3 00	....	....	Jeff. Davis has extinguished the gas-lights of Richmond, Va.
1859	Richmond	Mass.	40,000	25	—	January & July.	3,000	4 00	....	....	
	Richmond County	N. Y.									
1859	Ripley	O.	25.000	50	—	April & October.	2,000	4 00	....	....	
1852	Rochester	N. Y.	200,000	50	5	January & July.	50,000	2 50	....	....	
1857	Rockford	Ill.	40,000	50	—	Do.	4,000	4 00	....	....	
1854	Rock Island	Ill.	100,000	50	—	Do.	6,000	4 50	....	....	
1854	Rockland	Me.	50,000	100	—	Do.	6,000	4 40	....	....	
1852	Rome	N. Y.	85,000	100	3½	Do.	10,000	3 60	....	....	
1854	Rondout and Kingston	N. Y.	65,150	20	3½	June & December.	10,000	3 80	....	....	
1854	Roxbury	Mass.	150,000	100	5	January & July.	20,000	3 50	....	....	
1850	Rutland	Vt.	20,000	25	—	Do.	4,000	3 50	....	....	
	Saco	Me.	71,600	100	3½	April & October.	8,000	4 00	....	....	
1857	Sacramento	Cal.	500,000	100	—	Do.	40,000	10 00	....	....	
1859	Sag Harbor	N. Y.	20,000	—	—	Do.	4,000	4 00	....	....	
1858	Saint Albans	Vt.	15,000	20	—	Do.	3,000	7 00	....	....	
	Saint Johnsbury	Vt.	30,000	25	—	Do.	4,000	4 00	....	....	
1857	Saint Joseph	Mo.	50,000	100	5	January & July.	6,000	5 00	....	....	
1859	Saint Louis	Mo.	600.000	50	—	June & December.	180,000	3 50	....	....	
1857	Saint Paul	Min.	200,000	50	3	January & July.	10,000	6 00	....	....	Surplus $10,000, May 15, 1863.
1856	Salem	N. J.	30,000	25	3	Do.	5,000	3 56	....	....	
1850	Salem	Mass.	200,000	100	4	February & August.	30,000	3 24	....	....	
1859	Salem	O.	25,000	20	—	Do.	3,000	3 00	....	....	
1859	Salisbury	N. C.	14,600	50	6	May & November.	2,500	6 00	....	....	
	Salisbury Mills	Mass.	1,250	25	—	Do.	3,000	4 00	....	....	
	Salmon Falls	Me.	25,000	100	—	Do.	3,000	4 00	....	....	
	San Antonio	Texas.	75,000	20	—	Do.	40,000	6 00	....	....	
1854	Sandusky	O.	75,000	50	—	April & October.	9,000	3 00	....	....	
1859	Sandwich	Mass.	10,000	—	—	Private Works.	2,000	3 50	....	....	
1852	San Francisco	Cal.	2,000,000	100	4½	Do.	100,000	6 50	100	....	
	San Jose	Cal.							....	....	
1858	Saratoga Springs	N. Y.	39,000	100	—	January & July.	6,000	3 00	70	....	
	Saugerties	N. Y.	30,000	20	—	Do.	4,000	3 00	....	....	
1849	Savannah	Ga.	200,000	25	5	Do.	10,000	3 75	....	....	
1851	Schenectady	N. Y.	50,000	—	—	Private Works.	11,000	4 00	....	....	
1858	Scranton, Gas and Water.	Pa.	100,000	25	—	January & July.	6,000	3 80	....	....	About trying Water-Gas.
1857	Selma	Ala.	20,000	100	—	Do.	2,000	5 00	....	....	
1856	Seneca Falls and Waterloo	N. Y.	80,000	50	3	Do.	10,000	4 00	100	....	
	Shreveport	La.	40,000	25	—	Do.	3,000	0 50	....	....	
1856	Sing Sing	N. Y.	40,000	100	—	Do.	3,000	3 50	....	....	
	Smyrna	Del.						4 00	....	....	Petroleum Gas.
1860	South Adams	Mass.	10,000	25	—	Do.	3,000	4 00	....	....	
1859	South Bridge	Mass.	5,000	25	—	Do.	4,010	6 00	....	....	
	South Boston	Mass.	200.000	50	—	Do.	60,000	3 25	110	....	
	Springfield	O.	200,000	100	—	Do	20,000	3 50	....	....	
1854	Springfield	Ill.	75.000	50	—	January & July.	10,000	3 50	....	....	
1848	Springfield	Mass.	100,000	500	5	February & August.	10,000	3 60	140	....	
1855	Stamford	Ct.	6,250	25	5	April & October.	3,000	3 50	....	....	
1857	Staten Island	N. Y.	150,000	50	5	January & July.	26,000	4 00	95	....	

GAS-LIGHT COMPANIES IN THE UNITED STATES.—Continued.

Compiled from official sources expressly for the AMERICAN GAS-LIGHT JOURNAL.

CORRECTED BY JOHN B. MURRAY, No. 39 NASSAU STREET, NEW YORK, DEALER IN GAS-LIGHT SHARES.

When Chartered.	Town.	State.	Chartered Capital.	Par Val. per Sh. $	Semi-Ann'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
1859	Staunton	Va.	18,000	50	6	January & July.	4,000	7 00	....	....	
	Steubenville	O.	150,000	100	—	Do.	15,000	4 00	....	....	
	Stockton	Cal.	50,000	—	—	Do.	8,000	10 00		....	
1848	Syracuse	N. Y.	125,000	25	5	March & September.	25,000	3 00	112	....	
	Tamaqua	Pa.	40,000	25	—	Do.	3,000	4 00	....	....	
1859	Tarrytown and Irvington	N. Y.	70,000	50	—	January & July.	3,000	4 00	....	....	
1853	Taunton	Mass.	100,000	50	4	Do.	10,000	4 00	....	....	
	Terre Haute	Ind.	100,000	100	—	Do.	3,000	4 00	....	....	
	Thompsonville	Ct.	25,000	50	—	Do.	4,000	4 50	....	....	
	Tiffin	O.	25,000	20	—	Do.	4,000	4 00	....	....	
1853	Toledo	O.	100,000	50	3	Do.	8,000	3 50	....	....	
1847	Trenton	N. J.	100,000	20	4	Do.	15,000	3 42	....	110	
1848	Troy	N. Y.	200,000	100	4	June & December.	35,000	3 00	160	....	
1856	Urbana	O.	30,000	25	—	April & October.	3,500	4 00	....	....	
1849	Utica	N. Y.	80,000	100	4	Do.	22,000	3 60	....	....	
1853	Vicksburg	Miss.	66,000	50	—	March & September.	4,000	4 50	....	....	
1859	Vincennes	Ind.	25,000	100	—	January & July.	2,000	4 00	....	....	
1863	Virginia City	N. T.					20,000				
1858	Walden	N. Y.	2,500	—	—	Private Works.	1,000	6 00	....	....	
1853	Waltham	Mass.	100,000	100	4	January & July.	3,000	4 00	....	....	
1857	Ware	Mass.	30,000	20	—	Do.	3,500	4 00	....	....	
1861	Warren	O.	30,000	50	—	Do.	4,000	3 00	....	....	
1854	Warren	R. I.	20,000	25	—	Do.	3,000	4 00	....	....	
1855	Washington	D. C.	500,000	20	5	Do.	50,000	2 61	150	148	
1859	Washington	N. C.	15,000	100	—	April & October.	1,500	6 00	....	....	
1848	Washington	Pa.	20,000	25	4	January & July.	4,000	3 00	....	....	
1854	Waterbury	Ct.	100,000	25	—	Do.	4,000	4 00	....	....	
1852	Waterford	N. Y.	12,000	25	—	Do.	4,000	4 00	....	....	
1852	Watertown	N. Y.	20,000	100	—	Do.	10,000	7 00	....	....	
1856	Watertown	Wis.	25,000	100	—	Do.	5,000	5 00	....	....	
1858	Wautoma	Wis.	30,000	50	—	Do.	3,000	4 50	....	....	
1857	Waverly	Miss.	20,000	100	—	April & October.	4,000	5 00	....	....	
1854	West Cambridge	Mass.	60,000	100	—	February & August.	10,000	4 00	....	....	
1852	Westchester	Pa.	100,000	25	2½	Do.	3,500	3 50	....	....	
	Westfield	Mass.	25,000	100	6	Do.	4,000	4 00	....	....	
	Weston	O.	20,000	25	—	Do.		5 00	....	....	
1857	West Point	N. Y.	50,000	—	—	United States Military	Academy.	2 00	....	....	
1858	West Troy	N. Y.	100,000	50	3	January & July.	10,000	3 60	85	....	
1850	Wheeling	Va.	75,000	25	6	Do.	12,000	2 70	....	....	
	White Plains	N. Y.	20,000	20	—	Do.			....	....	
1856	Wilkesbarre	Pa.	50,000	50	—	May & November.	4,000	3 33	100	80	
1850	Williamsburg	N. Y.	1,000,000	50	5	January & July.	60,000	3 00	....	....	
1858	Williamsburg	Va.	30,000	25	—	Do.	3,000	4 00	....	....	Camp-fires of the Union Army light up this place at present.
1857	Williamsport	Pa.	70,000	25	4	Do.	3,500	3 80	....	....	
1850	Willimantic	Ct.	12,000	—	—	Do.	2,500	3 50	....	....	
1853	Wilmington	N. C.	60,000	50	5	Do.	8,000	5 00	....	....	
1852	Wilmington	Del.	200,000	50	5	February & August.	20,000	3 00	....	....	
1854	Winchester	Va.	35,000	50	6	January & July.	5,000	4 00	....	....	
1861	Windsor	Vt.	20,000	25		Do.	2,000	6 00			Make Petroleum Gas.
	Woburn	Mass.	20,000	—	—	Do.	3,000	4 00	....	....	
1856	Woodstock	Vt.	10,000	50	4	Do.	4,000	6 00	....	....	
1853	Woonsocket	R. I.	82,600	100	4	April & October.	4,000	3 50	....	....	
1856	Wooster	O.	25,000	50	—	January & July.	6 000	3 00	....	....	
1849	Worcester	Mass.	160,000	100	5	Do.	15,000	3 50	....	....	
1855	Xenia	O.	40,000	50	—	Do.	3,000	4 00	....	....	
1854	Yonkers	N. Y.	75,000	50	3½	Do.	6,500	4 00	102½	....	
1849	York	Pa.	40,000	57	3	June & December.	10,000	3 50	....	....	
	Yorkville	S. C.	20,000	25	—	Do.	4,000	4 00	....	....	
1858	Ypsilanti	Mich.	20,000	50	5	February & August	6,000	14 00	....	....	
1850	Yreka	Cal.	30,000	100	—	Do.	2,000	0 00	....	....	
1848	Zanesville	O.	44,600	25	4	Do.	10,000	3 00	....	....	

GAS-LIGHT COMPANIES IN THE BRITISH PROVINCES OF NORTH AMERICA.

When Chartered.	Town.	Province	Chartered Capital.	Par Val. per Sh. $	Semi-An'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
1854	Belleville	C. W.	33,040	100	4	January & July.	1,200	5 00	....	....	
1854	Brantford	C. W.	32,000	100	2½	Do.			....	....	
	Brockville	C. W.	50,000	—	—	Do.	5,000	4 00	....	....	
	Chatham	N. B.	50,000	—	—				....	....	
1854	Charlotte Town	P. E. I.	50,000	100	5	Do.	3,000	3 50	....	....	
1857	Cobourg	C. W.	30,000	—	-	February & August.	4,000		....	....	
	Dundas	C. W.	30,000	—	—	Do.	6,000	4 00	....	....	
	Frederick	N. B.	50,000	—	—	Do.			....	....	
1843	Halifax	N. S.	160,000	40	7	May.	30,000	3 00	....	....	
1850	Hamilton	C. W.	125,000	40	5	March & September.	20,000	3 50	....	....	
1848	Kingston	C. W.	80,000	100	—	Do.	6,000	3 50	....	....	
1853	London	C. W.	100,000	20	5	May & November.	5,000	5 00	....	....	
1847	Montreal	C. E.	400,000	40	—	March & September.	110,000	2 80	....	113	Last sale at this figure.
1854	Ottawa	C. W.	40,000	40	5	Do.	5,000	4 50	....	....	
1859	Point Levi	C. E.	25,000	25	—	January & July.	4,000	3 50	....	....	
1859	Port Hope	C. W.	28,000	20	4	May & November.	4,500	3 50	....	....	
1847	Quebec	C. E.	200,000	200	4	January & July.	60,000	3 00	....	....	
1848	Saint Catherine's	C. W.	80,000	20	—	May & November.	7,000	4 50	....	....	
1859	Saint Hyacinthe	C. E.	15,000	20	—	Do.	4,000	4 00	....	....	
	Saint John	N. B.	170,000	85	4	June & December.	25,000	3 00	110	110	Sales at this figure.
	Saint John's	N. F.	50,000	—	4	Do.	30,000		....	....	
1858	Sorel	C. E.	14,000	20	4	Do.	4,000	3 00	....	....	
1843	Toronto	C. W.	400,000	50	—		50,000	3 00	....	....	This Co. pay a quarterly div. of 2 per ct.

GAS-LIGHT COMPANIES IN CUBA, MEXICO, SOUTH AMERICA AND NEW ZEALAND.

When Chartered.	Town.	State.	Chartered Capital.	Par Val. per Sh. $	Semi-An'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
	Callao	Chile.		—	—	January & July.	20,000	7 00	....	....	
	Cardenas	Cuba.	50,000	—	—	Do.	180,000	5 00	....	....	
1857	Compania Cubana	Hav'a.	500,000	500	10	Do.			....	....	
	Cienfugos	Cuba.		—	—	Do.	12,000	5 00	....	....	These four towns are lighted by the Compania Cubana of Havana.
	Guanabacoa	Cuba.		—	—	Do.	14,000	5 50	....	....	
	Regla	Cuba.		—	—	Do.	10,000	5 00	....	....	
	Trinidad	Cuba.		—	—	Do.	16,000	5 00	....	....	
	Guines	Cuba.		—	—	Do.			....	....	
	Guyaquil	S. A.	150,000	—	—	Do.	35,000		....	....	
	Havana	Cuba.	2,000,000	500	—	Quarterly.	200,000	5 00	....	175	
	Lima	Peru.	100,000	—	—	January & July.	150,000		....	....	
	Maranham (Chartered)			—	—	Do.			....	....	
	Matanzas	Cuba.	53,000	—	—	Do.	180,000	8 50	....	....	
	Mexico City	Mex.	550,000	—	—	Do.			....	....	
	Montevideo	S. A.	500,000	—	—	Do.			....	....	
	Para (Chartered)			—	—	Do.			....	....	
18 4	Rio de Janeiro	S. A.	1,000,000	500	7½	Do.	300,000	4 00	....	....	
	San Iago	Chile.	500,000	—	—	Do.	180,000	7 00	....	....	
1857	Saint Jago de Cuba	Cuba.	450,000	500	—	Do.	25,000	5 00	....	....	
	Valparaiso	Chile.	500,000	—	—	Do.	85,000	6 00	....	....	
	Vera Cruz	Mex	500,000	—	—	Do.			....	....	
	Vi le Clara	Cuba.	50,000	—	—	Do.			....	....	
	Auckland	N. Z.		—	—	Do.			....	....	

PAPERS ON HYDRAULIC ENGINEERING.

BY SAMUEL MCELROY, C. E.

No. 4.—City Sewerage.

[From the Journal of the Franklin Institute.]

(*Continued from page* 171.)

Utilization.—It often happens in the engineering world, that the step from correct theory to complete practice, is almost impossible, from intervening mechanical difficulties. In machinery, the rotary engine is a case in point, and there are various other illustrations of the hindrances which may arise between an educational conclusion and a successful manipulation.

While it is plain, then, from the facts above presented, that the fertilizing value of sewage in large cities is represented by millions of dollars, and is daily thrown away, the same facts show the obstacles which are involved through the very combination of sewage flow, and prevent an economical and convenient separation of the constituent manures.

The analyses of sewage water, show different proportions of solid matter, in some cases less than 1 to 1000, in others 1 to 420, 1 to 330, and 1 to 142. Advocates of utilization have assumed the proportion as 1 to 600, from observations given in the Report of 1853.

In the conclusions of value derived from the analysis of Professor Way, which makes the proportion 1 to 330, the solid contents of 100 tons of sewage are about 708 pounds, of which about 43 per cent., or 328.67 pounds, is valuable. It farther appears, of that this 43 per cent. but $\frac{118}{330}$, or about one-quarter, is classified as of high value, or less than 12 per cent. of the entire reduced solid constituents. To produce 11.81 tons of concentrated manure, requires 100 tons of solid matter, or 31,638 tons of sewage water, or 6,960,360 gallons, and the value is £562 3s. 8d., or $2,811 when the process is complete.

It is evident, then, that the enormous dilution of the fertilizing matter in sewage, while it proves its fluent character, also involves the use of most extensive works in grounds, structures, and machinery, to effect its reduction to commercial value, except in those isolated cases, as at Milan and Edinburgh, &c., where the ordinary outfall of the sewers can be conveniently and by gravitation distributed over broad plains, without artificial reduction.

And this state of facts explains the failures which have attended the various local attempts hitherto made to concentrate sewage manure, artificially, by precipitation under treatment of milk of lime, and by other apparently simple processes. For the process in use, in a limited operation at Cardiff, it was shown that 50 square miles of area would be needed to reduce the London sewage, and all other processes are embarrassed at once by the vast quantities of useless matter to be moved and disposed of.

The city of Paris, governed as to its street dirt and cesspools under the strict rules of the *Ordonnance* of 1819, which provides for the systematic removal of these products to places of direct application and manipulation, without the embarrassment of the sewer water, also furnishes in the ratio between cost of removal and income, a decisive argument against the economical or remunerative application of sewage, in a diluted state by results when undiluted; and narrows the question down to the relative propriety of her system of distinct separation of sewage matter, and its special transportation, for the sake of its questionable item of income.

In this special argument, however, the cost of transportation, which is formidable to any city, may be laid aside, as a sanitary necessity, and the Parisian system credited with the entire income of its *poudrette* and street dirt, except so far as it is a matter of demonstration that the cost of cartage largely exceeds that of underground disposal, and the process is objectionable in point of sanitary effects.

In the present state of experience on this subject, it may be assumed that sewage manure, to realize its proper value, under ordinary conditions of sewer outfall, must be kept free from dilution, or in other words, must be prevented from entering the sewers; and that the cost of its reduction is not, up to the present time, justified by the prospects of income. This is the conclusion of scientific men, after much experimental investigation.

There are, however, some subordinate considerations under this head, worthy of special application, while the whole matter offers itself to continued study and trial. Analysis shows the value of the products of public urinals, and chemistry shows that cheap articles, such as gypsum, chloride of calcium, superphosphate of lime, &c., form combinations with urine, free from smell and retentive of its most valuable properties. In stables, hotels, and public urinals, it is therefore a very simple matter to correct a present common nuisance, and at the same time obtain a valuable manure with small cost, by any adequate arrangement for such combination, which will readily suggest itself for each locality. The luxurious style of our present hotel life, requires this addition to the comfort of the guests, in increased atmospheric purity, and it will pay.

Sanitary Results.—The sewage matter of houses and streets, if dissolved or suspended in cool water, and promptly removed from the city precincts, exerts no injurious effects on the subsoil or the atmosphere; but if the water, which is the proper medium of conveyance, is permitted, from defective sewer action, to deposit the sewage matter under the houses and pavements in the lateral and main sewers, the process of fermentation begins at once to affect the public health. This is true also of the cesspool system in ordinary use, by which decomposition is continually promoted, as an atmospheric effect, and the subsoil contaminated with injurious results to public and private wells and with noxious exhalations.

The great atmospheric deep, pressing over and around a populous town, is prompt to receive and to retain for effect on human health, the evaporations and distillations of the more solid and tangible base. And when we are told "it has been proved scientifically that the atmosphere taken from above a dung heap is purer than that taken from over Paris," we are forcibly reminded of the vast power for evil, treasured up in the hidden depths of every imperfect system of sewerage, and of the injurious influences which are constantly at work. If we add to this a thought of impregnated drinking water, the general warning is complete, and an important key is furnished to the investigation in hand.

The offensive gases, carburetted and sulphuretted hydrogen, miasmata from decaying vegetable and animal substances, and other combinations evolved from collections of sewage matter, are directly obnoxious to public health, in atmospheric effects, which are aggravated or extenuated by various local or special conditions. One portion of sulphuretted hydrogen in 1,500 parts of air will kill a kid, one in 800 will kill a dog, one in 250 will kill a horse. It is therefore certain that emanations of this and other kinds in various degrees of combination, must be injurious in proportion to their qualities.

In sparsely settled localities and in certain states of atmospheric change, the ordinary cesspool system may be deprived of serious effects; but in cities where property is bought and sold by the square foot, where buildings are erected in dense blocks, carried to great heights and closely peopled, where the streets are narrow and lanes and alleys are common, where the soot, smoke, products of manufactures, and other influences contaminate the atmosphere, and especially in low barometric seasons, the effluvia from the congregated thousands of stagnant cesspools, each a magazine of disease, may well be considered a most objectionable addition to the surcharged air and a fruitful source of malarious diseases.

The medical testimony on this point, in cases directly traced to this special cause, is sufficiently voluminous and conclusive. The contents of a cesspool being used as manure, in school gardens at Clapham in 1830, within six hours every individual was taken with the cholera and two died; at Hastings typhus fever appeared regularly, at the outlet of the town drains, while other parts were free from it; a block of houses in the cloister of Westminster, being the seat of a severe epidemic fever, from fifteen houses 150 loads of night soil were removed, and a new system of sewerage applied, with an immediate change in the atmosphere and an immediate correction in the local mortality; at Antwerp it is observed that though in certain states of the weather no offensive odor could be perceived, yet whenever any fog hung over the city the diffusion of noxious gases was rendered disagreeably sensible, a result common to many other cities; no city regulates its cesspools and street cleaning as rigidly as Paris, yet its atmosphere is said to produce an unpleasant sensation, and the air of its houses is impregnated with emanations from the water closets; the London Fever Hospital, reports for 1851, the receipts of 10 or 12, and in one instance 20 patients, from single houses of a district, where the cesspools were kept in the cellar; in some cities, as at Albany, where sewers have been in part built, the old cesspools are retained, but connected by drains, as overfall outlets, with the street sewer, a process which retains the original evil of accumulation; in other cities, as in Brooklyn, the third in rank in the United States, the subsoil percolation through a gravelly foundation was, until recently, relied on for freeing the cesspools, a very large number being still retained in use, since the construction of water-works and sewerage.

The cases of mortality which mark this general system of sewage accumulation and decomposition, might be indefinitely multiplied in evidence, but they all present the same general argument against the entire practice, in following which, mankind is demeaned beneath the example of the animal race in a state of nature.

But the evil of this practice is not confined to miasmatic effects, since the water used for daily consumption and drawn from wells, or left exposed in vessels or cisterns, is impregnated by its powers of absorption from contaminated earth and air. In the lower districts of London, the excess of surface water is thrown upon ground imbued with cesspool matter, which it causes to permeate through the stratum into wells and saturate basement walls and foundations. In one parish closely examined, (Southwark) 48 per cent. of the wells were perceptibly foul or tainted, 82 per cent. of the houses having cesspools, and 18 per cent. had damp and saturated foundations. Comparing the highest and lowest districts of the city, it appears that in 1838, the deaths from fever were, in one case, 1 in 255, and in the other, 1 in 425; in 1832, the deaths from cholera were 1 in 200 and 1 in 551; and in 1849, 1 in 118 and 1 in 347. Between the highest, the intermediate, and the lowest districts, the ratios in 1849, were 1 in 346, 1 in 256, and 1 in 93. In Albion Terrace, several houses having been depopulated by cholera, it was observed that, among other exciting causes of disease, the cesspools or drains had overflowed into the subterranean cisterns from which the inhabitants derived their supply of water; at Rotherhithe, in 16 houses, supplied from one well, subject to infiltration from an open ditch, 20 cases of cholera occurred; "it stands," we are told, "upon the evidence of common observation, and upon the testimony of the senses of taste and smell, that the waters of the same source and composed of the same chemical constituents, may be largely varied in quality by exposure to different atmospheres, and that impure water taken in the stomach occasionally produces more sudden and violent effects than impure air introduced into the system by the respiratory apparatus;" the analyses of all city wells, compared with the sources of their supply, always show a marked impregnation; many of the wells of London, with over 120 grains solid matter per gallon, are less pure than the sewers which flow past them; New York, long before the introduction of the Croton, was obliged to abandon the use of various wells; in Brooklyn, wells show over 60 grains per gallon, where their supply veins, uncontaminated, contain less than three; these results, which are universal in kind, if not in degree, can have but one explanation, and that is conclusive on this point.

If, to this cesspool and subsoil contamination of the air breathed and the water drank, the system of sewers in use, from imperfect action, becomes a depository of sewage matter, the evil is greatly aggravated, since from beneath houses and streets, finding egress through every vent-pipe and gulley, the outer atmosphere and that of the residences, become exposed to flowing currents of noxious gases.

It is as Victor Hugo says: "We might say, that for the last ten centuries, the cloaca has been the misery of Paris, and the sewer is the viciousness which the city has in its blood. * * * * It was said

proverbially, *Going into the sewer is entering the tomb*, and all sorts of hideous legends covered this colossal cesspool with terrors. * * * Fagot attributed the malignant fever of 1685 to the great opening of the Marais drain which remained yawning until 1833. The mouth of the drain in the Rue de la Mortellerie, was celebrated for the pestilences which issued from it; with its iron-pointed grating that resembled a row of teeth, it yawned in this fatal street like the throat of a dragon breathing hell on mankind." Experiments with infusoria, fish, and birds, show the fatal character of the sulphuretted hydrogen evolved from decomposing sewage matter, and moisture facilitates the escape of odors, where saturation would tend to repress them. In the Surrey and Kent District, London, (1850,) in one week, about 1,000 loads of sewer deposit were removed; a sewer in Earl street, five feet by three, accumulated 6,000 cubic feet of deposit in thirty-one days, from 1,200 houses; the London sewers generally show a deposit of two feet, and in some cases of five feet; and the whole evaporating surface of stagnant and pestilent matter is estimated (1852) as equal to a canal fifty feet wide, ten miles long, and above six feet deep, or an area of 800 acres, six inches deep; in collecting specimens of sewer water for analysis (1857) it was observed that heavy rains greatly increased the proportion of solid matter—in one instance from 32.17 grains minimum flow, to 296.97 grains, in storm-flow; the enormous Cloaca Maxima of Rome is nearly filled up, and the Campagna was ruined by the city drains for cultivation or residence; what is true, then, of Rome, of London, and of Paris, is true of similar cases, all the world over, and the elements of slow disease or swift pestilence, are garnered up most surely, where the very seat of public health and comfort should be firmly established. If a drink of impure water is not followed by a cramp, and a sniff of air "foul enough to knock a man down," fails to do it, the several persons who make up a family, and the families who make a community, following the old customs, fail to trace to the true sources the fatal effects which are common to many families, and which sometimes startle entire cities with a sweeping brand of death.

(To be continued.)

Cornish Pumping Engines.—It appears from a tabular statement prepared by the proprietor of *Lean's Engine Reporter*, for the years 1841 to 1860 inclusive, that the average duty of these engines has fallen off from sixty-eight millions in 1844, to fifty-two millions in 1860, or 25 per cent; also that less interest was now felt in the performance of these engines, as while fifty were reported in 1841, only fifteen were reported in 1858, and twenty-five in 1860. Although the nominal, or reported duty, showed this marked diminution, it was not asserted that there had been an actual falling off to the extent thus indicated—for the duty paper did not take into account the quality of the coal, which was certainly inferior to that used twenty years ago; besides which, the present practice of sinking the engine shaft for the whole or part of its depth, in an inclined direction upon the course of the lode, must have tended to increase the friction of the pit-work, and the mines were also deeper than formerly. Nor was expansion of steam adopted to so great an extent now as it was some years ago: it was then carried further than was compatible with safety as was evidenced by the repeated breakages of the main rod, the piston rod, and the other principal parts of the engine. But after allowing for all these legitimate causes of the falling off of duty, it was thought that the average duty of the county was still at least ten millions below what it should be.—*Scientific American.*

Illuminating Power of London Gas.—Dr. Letheby's report of the average illuminating power of the gas supplied to the city of London for the first week in November, states, that the illuminating power had been good, but, in the case of the Great Central, and Chartered, the chemical quality was very bad. The average proportion of sulphur in the Chartered company's gas was 22.3 per 100 cubic feet, and in the Great Central 21.2; that of the City Company's gas being 19.5. In 12 out of 18 observations, the amount of sulphur was above that allowed by Parliament.

PETROLEUM ITEMS.

Oil Creek Valley, Pennsylvania.—The producing portion of Oil Creek is a valley, or flat, some eighty rods wide, lying on both sides of the stream. This flat extends from the mouth of Oil Creek to Titusville, some seventeen miles. But no oil of consequence has been produced beyond the Noble and Delamater well, which is distant from Oil City ten miles. From the general appearance of the face of the country, this whole flat was at some remote period a marsh, many patches of which can still be seen. There appears to be no further difference in the grade, so to speak, of this whole flat, than the natural one required to cause water to flow. This grade has been estimated, roughly, at from thirteen to fifteen feet to the mile. The hills on each side of the creek are well wooded with hemlock and oak, and in many places form very abrupt bluffs. Pure water, in great abundance, pours down from these hill-sides. The scenery is as fine and picturesque as we have ever seen. Most of the farms along the Creek are well covered over with oil derricks, which are erected in order to bore the wells. These wells generally average from 450 to 500 feet in depth. Some few, for instance the Egbert, and Dalzell, and Ewing Farms, have not as yet been much developed. How rich they are in petroleum may be judged from the fact that the Maple Shade well, on the Egbert Farm, has been producing 1,000 barrels of oil per day for some time past, and the Dalzell and Ewing well flowed for many months from five to six hundred barrels per day. This farm is without any encumbrances, the owners having put down all the wells there is on it. Probably the value of the oil already taken from it, will not fall short of half a million of dollars. It comprises about a hundred acres, we believe, and we don't suppose less than a million of dollars would buy it. Other parties value their farms fully as high. This will give the reader an idea of the value of oil lands. A few short years since, all along this Creek was little else but a country place, with here and there a farm-house. Now there are three flourishing villages upon its banks, McClintockville, Rouseville, and Tarrville. But we can assure our readers that from Oil City to the Noble and Delemater well, ten miles, there is a continuous town, so thickly stand the dwellings and engine-houses on each farm, while the derricks tower far above them. In boring a well, or pumping, many of the operators work day and night. The scene presented upon one of these farms at night is grand. The flames from the top of smoke stacks, shooting through the surrounding darkness, create a brilliant dark red color, tinged with black, while the hammering and clinking of the drills, would cause an imaginative person to think that he had accidently happened upon old Vulcan's workshop. In the towns we have mentioned, there are meeting-houses and Sunday-schools.

We should estimate the present population of Oil Creek, and the contiguous villages, at not less than 10,000. The number of refineries in Oil City, and directly upon Oil Creek, is about 40, and many more are in process of construction.—*Oil City Register, October* 29.

Antiquity of Petroleum.—It is very generally conceded that petroleum, although of very recent general introduction into the market of the world, has long been known to our Indians, and for many centuries the small quantities floating on streams have been collected by them in blankets, and have been used by them as a sovereign remedy for all ills that flesh is heir to.

Our attention has, however, been directed by a classical and patriotic correspondent at New Bedford, to the probability that petroleum was known and used long antecedent to the Christian Era. We incline to the belief that our correspondent's views are right, and therefore annex his remarks:

"This oil business is a new one in this country, but the oil itself has been used for centuries in India. Plutarch relates that Alexander the Great discovered on the banks of the river Oxus, on the eve of battle with the Persians, an oil spring, 'A singular circumstance, says he, 'as there were no *olives anywhere in the neighborhood.*' The oil did not differ from ordinary (*i. e.* olive) oil in any respect

"Alexander consulted the oracle, and was told that it was an omen of victory, that the gods had provided oil to bathe the wounds of those who should suffer in the coming battle, whereupon Alexander 'went in' and won a great victory.

"Is it not a striking coincidence that this should have taken place some three hundred and fifty years (if my memory serves me rightly) B. C., and that eighteen hundred and sixty-three years after the Christian Era, the surgeons discovered on the bloody field of Gettysburgh, that this same oil was just the best thing for wounds (particularly as it kept away all insects). May we not take similar courage, and feel that the omen of victory is with us in this struggle, as it was 2,200 years ago with Alexander?

"I believe it is generally considered that the fires which were continually burning on the altars of 'vestal virgins,' were petroleum. It was supposed to indicate a great public calamity if these fires went out. So, I think, we have the classics with us in our business."—*N. Y. Oil Trade Review.*

Freshet in Oil Creek.—A freshet occurred on Oil Creek on the 22d ult., when about 200 boats laden with petroleum, started down, carrying about 20,000 barrels. In a few places the boats were jammed, owing to the hurry and confusion to get out of the creek, and the loss incurred has been estimated at about $20,000.

Application of Petroleum Refuse for Fuel.—Mr. A. L. Fleury, chemist, of Philadelphia, writes as follows, concerning the application of petroleum refuse as a fuel:—"The applications of Petroleum, Coal Oil and their derivatives, in the Arts are wonderfully increasing. Having always taken considerable interest in this department of the Sciences, it gives me pleasue, at all times, to communicate such information as may lead to the further development of these valuable products. Mr. Gerhardt, of Philadelphia, has recently patented a very ingenious process for using up all the coal oil refuse, by preparing it in a new form of fuel, as well as producing a material for the manufacture of excellent burning gas. The manner of preparing the same is novel and cheap, and I shall in a future communication explain the same fully. The question, where we can get a good and cheap fuel in these times is an important one, and the above mentioned invention may fully supply it."

The Velnango Oil Fleet.—But few persons not intimately connected with the patroleum business, can form an adequate idea of the extent of the carrying trade which this product involves. On Monday last, we took a trip along our wharves, and up the creek a short distance, in order to ascertain the number of oil boats now on hand. As near as we could ascertain there are 525 boats, consisting of flats French Creekers, and barges now engaged, or waiting to be employed, in this immediate vicinity. The value of these boats will range from $600 each to $125. The number of steam tow-boats engaged in this business last year was fourteen, valued at from $10,000 to $15,000 each, but we learn that several more will be added this season. Besides these there, are seven passenger steamers, we understand, to be placed on this route the present season. The value of these boats each, is about $20,000. Thus we have some 524 oil boats, probably not less than 18 steam tow-boats and seven passenger steamers in the oil trade. This petroleum navy employs directly and indirectly, the services of between 3,000 to 4,000 men, and the business is increasing fully one-third larger every year. What other locality can beat this in the same length of time?—*Oil City Register, November* 19.

Shipments of Petroleum.—The following is a statement of the shipments of Petroleum over the Oil Creek Railroad, from January 1, to November 1, 1863:

January.....bbls.	18,450
February	33,658
March	34,287
April	8,203
May	21,854
June	54,503
July	51,578
August	44,172
September	53,993
October	40,542
Total	361,542

THE AMERICAN GAS-LIGHT JOURNAL is published on the 1st and 15th of every month, and is the recognized official organ of

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Its purpose is to ascertain and make known all new discoveries in the science and economical application of LIGHT, and promote thereby the interests of companies and consumers; to encourage and aid the introduction of PURE WATER from Lakes and Rivers into Towns and Cities, and to improve the system of SEWERAGE, VENTILATION, HEATING, and DRAINAGE everywhere.

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THE

AMERICAN GAS-LIGHT JOURNAL,

PUBLISHED ON 1ST AND 15TH OF EVERY MONTH.

C. ELTON BUCK, ... EDITOR.

TUESDAY, DECEMBER 15, 1863.

Among the numerous projects brought forward in England, is that for making illuminating gas from spent tan, which we have already noticed in our items of news from that country. The "Tan Gas and Charcoal Company, Limited," has been organized with a capital of £20,000 for the purpose of putting the scheme into practical operation, and according to advertisements inserted in the London technical journals, the directors are now sitting daily to allot shares to those who may wish to be interested. The company publish a schedule of the estimated expenses and profits of working the process, which, on paper, and according to their interpretation, looks very flattering; and if no questions be asked, and their simple assertion be taken for granted, there will be very little difficulty in getting the necessary funds subscribed, for money is very abundant in England, while valuable securities are much in demand. From the statement of the company we abstract the following table, showing the products from one ton of the raw materlal alone, and when used with tar, which we suppose means coal tar:

TAN ALONE.

	£	s.	d.
Charcoal, 5 cwt. @ £2 per ton	0	10	0
Ammonia sulph. 46 lbs. @ 14s. per cwt.	0	5	9
Acetate of soda, 30 lbs. @ 24s. per cwt.	0	6	5
Naphtha, 2 gallons, @ 2s. 6d. per gall.	0	5	0
Illuminating gas, 15,000 feet, @ 1s. per 1000	0	15	0
Tar, 7 to 8 gallons	0	0	0
	£2	2	2

TAN AND TAR.

Charcoal, 5¼ cwt. @ £2 per ton	0	11	0
Ammonia sulph 105 lbs. @ 14s. per cwt.	0	13	1
Acetate of Soda, 44 lbs. @ 24s. per cwt.	0	9	5
Naphtha, 4 gallons, @ 2s. 6d. per gallon	0	10	0
Illuminating Gas, 17,000 feet, @ 1s. per 1000	0	17	0
Tar, 10 gallons	0	0	0
	£3	0	0

In addition to this favorable statement, it is said that the cost of production will not exceed 10s. per ton, and that working 150 tons of raw material per week, the gross return of the company will be £300 per week. This is certainly a very flattering picture, but it has another side, which to the eyes of certain engineers does not present quite so favorable an aspect. For instance, Mr. WILLIAM KING, of Liverpool, who has made some experiments with this process, the results of which are very different from those put forth by the company, has addressed a letter to an English paper, in which the following figures appear, the average results of several experiments:

Gas per ton	12,000 cubic feet.
Coke (charcoal) per ton	588 lbs.
Impurities in foul gas	23.3 per cent.

The gas after purification by lime, contained—

Matter condensed by bromine,	5.5 per cent.
Carbonic oxide,	32.00 " "

Mr. KING's report further says:

"A large quantity (740 lbs. per ton) of water, having a very feeble alkaline reaction, was collected in the condensers, but scarcely any tar was produced.

"The illuminating power of the purified gas, for a consumption of 5 cubic feet per hour in an argand burner, was equal to the light of 3.78 spermaceti candles, each consuming 120 grains per hour.

"The charcoal is quite worthless as fuel, but might possibly be used for sanitary purposes."

Thus it will be seen that there is some difference of opinion as to the profitable working of the tan gas enterprise. In our last number we alluded to the fact of spent tan containing so much water as to make it unfit for the generation of illuminating gas, but after drying it at 212° F., as Mr. KING did, the amount is even greater than we at first supposed. It will be seen that the statements of these two parties do not agree in a single particular. The patentee of the process states, that "the gas is very pure and highly illuminative," while Mr. KING makes it equal to only 3.78 candles. The patentee claims to produce 15,000 cubic feet to the ton of raw material, while Mr. KING reports but 12,000 cubic feet, and instead of 46 lbs. sulphate of ammonia, he obtained a large quantity of water "having a very feeble alkaline reaction." This is surely a very wide discrepancy, and one or the other of these authorities must be far in the wrong. With such grave aspersions cast upon the patent process for making tan gas, we are inclined to think that the company will have some trouble in getting the amount of their capital stock subscribed. If there is any value in their process, they certainly owe it to themselves to deny the statements made by Mr. KING, for they must certainly exert a very damageing effect upon the hopes of the patentee, and the promoters of the projected enterprise.

For our own part, without having at all practically examined the gas yielding properties of tan, we should be disposed to assent to Mr. KING's views of the subject. The large amount of water generated, and the heavy percentage of carbonic acid, and other impurities, must certainly reduce the illuminating power of the gas to a low figure, and preclude the possibility of its ever becoming a success. We shall look for the reply of the company to Mr. KING's statement, and if one be forthcoming we shall advise our readers of its nature. If no reply be made, we shall think the objections well founded, and the tan speculation one of the numerous catch-penny affairs with which the age abounds.

ANSWERS TO CORRESPONDENTS.

B. W. S., of Mass.—*According to Dr. Henry one cubic foot of olefiant gas weighs 520 grains. It requires for its combustion 3 cubic feet of oxygen. The results of its combustion are 2 cubic feet of carbonic acid gas and 620 grains of water.*

A. J., of Ky.—*The theory you broach is an old one which will not stand investigation. You had better read up the subject.*

E. L. T., of Me.—*Your books have been sent.*

B. B. J., of Md.—*We can commend the invention highly, as we have seen it in actual operation, where its results were all that were claimed for it.*

J. W. M., of Pa.—*The price of gas remains the same. Some rumors of an advance have gained currency, but we believe them to be without foundation.*

E. P. C., of N. Y.—*The loss must result either from condensation or leakage: very likely the latter.*

A. A. V., of N. Y.—*Your pamphlet was received. Your request shall be attended to.*

DEATH OF A GAS ENGINEER.—Alexander Smith, Esq., chief engineer of the Birmingham, England, old gas company, died at his residence on October 6th. Mr. Smith had reached the advanced age of eighty years, and was universally respected and esteemed.

CORRESPONDENCE.

REPORT OF THE STATE INSPECTOR OF GAS-METERS.

State of New York, Office of Inspector of Gas Meters, 561 Broadway.

NEW YORK, Dec. 9th, 1863.

To the Editor of the AMERICAN GAS-LIGHT JOURNAL:

In compliance with your request, I herewith send you a statement of the business of this office from December 1st, 1862, to December 1st, 1863:

There have been during this time 9,108 meters inspected, sealed and delivered to the Gas Companies throughout the State.

The total number of meters inspected since the meter inspection law went into effect has been.....55,504

The total number of Proving Apparatus inspected..79

The total number of Station Meters inspected..... 9

Yours truly,

GEO. H. KITCHEN, Inspector.

GAS AS A CALORIFIC AGENT.

We have frequently written on the advantages of employing gas as a source of heat, and have used it for a long time for laboratory purposes, but until this winter we have not depended on it for warming an apartment. We now have in our office a gas stove made by Mr. A. L. Bogart, No. 592 Broadway, which has given great satisfaction. It is perfectly odorless, neat in appearance, very cleanly and requires no attention. The gas has simply to be turned on and the burners lighted, when it immediately diffuses throughout the apartment, a degree of warmth sufficient for the coldest weather. At the present high price of coal, we find it decidedly cheaper to use gas, to say nothing of the advantages of being freed from the annoyance of dust, ashes, &c., which all coal stoves create. There have been some very cold days since our stove has been in operation, but our rooms have been very comfortable, and we use no other source of heat. Mr. Bogart's stoves are the only ones we have examined which give off no odor. Those of our readers who wish to make a trial of the calorific powers of gas, would do well to bear this in mind. We have seen some gas stoves, with high sounding names, which emit a very disagreeable smell, and many persons are of the opinion that all gas stoves are liable to the same objection. We assure them them that this is not the case with the one above referred to. By a full supply of air to the burners, no gas escapes combustion, and no more odor is given off than that which is eliminated from gas burned for light, which, if the gas be of good quality, is none at all.

CONTAMINATION OF WATER.

IMPERFECT DRAINAGE OF TOWNS AND VILLAGES.

Dr. Stevenson McAdam recently read the following paper at the sessions of the Social Science Congress. We take our report from the *Social Science Review*, of London.

The importance of the Police and Improvement (Scotland) Act, 1862, which was promoted by Provost Lindsay, can hardly be over-estimated, and the advantages to be gained by the adoption of the Act in any locality where human beings are congregated will not be questioned by men at all conversant with sanitary matters; but, in communication with some towns and villages, there is a large amount of ignorance in regard to the Act. The necessity and advantages of this measure are hardly understood, and it is even questioned in its clauses by the inhabitants of many towns and villages. The provisions of the Act are looked upon as merely an equivalent to a slight annual expense, and almost the first question which is asked is as to the expense which may be incurred. The better health is hardly entertained till the sum of the cost has been reckoned. There is a great repugnance to be placed under assessment, and a feeling exists that the commissioners appointed from each town or village will form themselvet into an exacting board, and ruin themselves and their neighbors.

The inhabitants of our towns and villages are apt to contrast the death-rate of their own place with that of large cities, forgetting that nature, whilst it favors them in many things, still requires every effort should be made to derive the full benefit. The scant population, and possibly the high locality, may enjoy reason-

ably good health, but the latter may not be the full measure which the locality and climate should ensure.

For some years back I have been engaged in the investigation of matters relating to the sanitary conditions of towns and villages, and my attention was specially directed to the influence of want of drainage on water employed for drinking and culinary purposes.

The majority of towns and villages carry on a system which is positively unwholesome and detrimental. In the better class of dwellings, each house, when built, is provided immediately underneath, or in a small back garden, with two holes, one of which is the well with a pipe leading to the house or only to the pump, and the second is the cesspool with a pipe coming from the house; the water is drawn from the one hole and returned to the other.

The well is in most instances dependent for its supply on the percolation of water from the sides and bottom, and thus sucking water from the neighboring ground; whilst the cesspool of the house is not many yards away, and the liquid from the cesspool oozes through the soil and enters the well.

The principle on which the well is dug is that it shall receive the water from the ground or channel, and the principle involved in the construction of the cesspool is, that water escapes into the ground whilst the solids are left behind; so that the cesspools supply, in part at least, the wants of the well. This connection is well seen in the rise of the neighboring stream or river, which, oozing through the channel or ground, raises the height of the water in the well and the cesspool. That cesspools are related to wells in this manner is abundantly evident from the chemical examination of the ground and the analysis of the water. The ground around the cesspool is more or less impregnated with the products of putrifying organic matter, and whilst impurities are left in part in the ground, some enter the well. Occasionally the sides of the well are stained with an offensive slime, and in many instances, when cleaned out, the wells are found to contain a large quantity of disgusting matter.

The sewage discharged from a house when comparatively fresh, is comparatively harmless, and there is little danger; but when putrefaction sets in, and especially if the matter is arrested by cesspools in the neighborhood of dwellings, there is much danger. In putrefying, some of the offensive matter becomes liquid, dissolves in the water, and permeates the soil, and often communicates a greenish yellow color and offensive taste and odor. The change proceeds further, however, and the water, whilst charged with the *debris* of animal matter in solution, may be clear, bright, and sparkling, and have a pleasant cooling taste, which are apt to deceive people. The material has then passed in great part into the ultimate stage of putrefaction and decay, yielding nitrates which are dissolved in the water.

I have examined many samples of water of pleasing appearance, and which were famed as good drinking waters, but which, on analysis, showed the presence of from 2 to 30 grains of organic matter to the gallon, and 1 to 10 grains of nitrates. The latter, or nitrates, form the ultimate stage of decay, and are indicative of the previous states having been passed through, and which are undoubtedly the most deleterious. But where a water contains organic matter and nitrates, there can be no doubt that all the stages of decomposition have been going on.

The evil influence of such water has been observed in many places. Waller Lewis states that the London postmen who suffered much from diarrhœa, after drinking water derived from a pump at Goldsmith's Hall, the water of which contained much of the products of decaying organic matter, were much improved in health by substituting drinking fountains and filters; and the now famous Broad street pump, the drinking of the water of which gave rise to many cases of cholera, was clear and sparkling, and was thought highly of, and yet was found to contain much organic matter from sewage.

The temperature of the season has doubtless much influence, as it increases the danger, owing to the more ready putrescence of the organic matter at the more genial temperature.

Many people may not apparently suffer from using such water, but some are influenced seriously, and directly or indirectly there is no doubt that the use of such water predisposes to disease. Independently of the presence of organic matter and nitrates, such water acts injuriously by dissolving the lead from pipes and cisterns, and thus gives rise to cases of lead poisoning.

Surface drainage is likewise a source of mischief. In the smaller houses all the water is thrown to the door, accumulates in gutters where in part it evaporates, in part putrefies, becoming green and slimy, evolves deleterious gases, and in other part permeates the soil, and passes into the wells. Any filth thrown on the surface of the ground may also be carried by rain water into the soil and penetrate the wells. Stagnant streams, as at damheads, which contain animal and vegetable life, and which putrefies, are also sources of impure, unhealthy water.

There can be no doubt that it is in ill-drained places that fever lies. I am not forgetful of the evil effects of overcrowding. Chemically, there is no essential difference between the deleterious gases exhaled during the daily wear and tear and decay of the animal system, and breathed out into a close room to be rebreathed, and the hurtful gases evolved from organic matter breaking up or putrefying out of the living system. The bad air breathed out, and the foul air from ill-drained streets and cesspools, are twin sisters, and are equally destructive and equally capable of being removed from us.

I am confident that in by far the majority of instances the cesspool system, as carried out in our towns and villages, is unwholesome. The health of the place may rank favorably with large towns or cities; but as these cities have by proper drainage and other sanitary measures, been improved in the proportion that the deaths are now only three instead of four, and even only two instead of three, it follows that, by the same application of sanitary measures, there will be a similar extension of life or decrease in the death-rate in country towns and villages.

It is against every principle in nature that we should let air, water, or sewage stagnate. There is nothing stagnant or at rest in nature. The air is in constant circulation, and the water which may be in the ocean rises in vapor, becomes cloud, then rain, and back by the river to the ocean again. And shall we allow to stagnate for years, in the neighborhood of our dwellings, the decomposing, putrefying remains of all the vegetable and animal matters which we have consumed as food for these years? It is impossible for all men to agree on even so important a point, and I am confident that it ought to be rendered imperative that at least the draining and cleansing clauses of the Police Act should be adopted in every town and village.

THE GAS COALS OF GREAT BRITAIN.

The vast variety of coals obtained from British collieries alone is a matter of peculiar interest to the geologist and mineralogist, and, in an industrial point of view its importance can scarcely be over-estimated. Gas-coal, house-coal, and steam-coal are varieties deriving their names from purely commercial and industrial considerations; and, although the properties constituting the difference in these three kinds of coal merge into each other, there is, nevertheless, even in average external characteristics, a very distinct and easily-recognisable difference, by which the engineer and miner may be guided in seeking the most suitable market for any class of coals.

The gas-coals are not less heterogeneous in their composition and properties than are the other varieties we have named, although there is, perhaps, a greater uniformity of lustre, of fracture, and of hardness among them than is the case with other varieties, and, therefore, so far as appearances go, they are not so nearly related to the house and steam varieties as these are to each other. These remarks refer more particularly to what are called the "Cannel" and the "Parrot" coals, as there are a great many "caking" coals which, though differing in a very slight degree in external feature from the ordinary open-burning variety, contain, nevertheless, a valuable amount of gas of high illuminating power, and are, consequently, used in gas making, and referred to in the market and in science journals and books as gas coals. The so-called "Boghead mineral" is a gas-coal; although somewhat peculiar in its lustre, scratch, or powder, and in its fracture, it, nevertheless, has a very near parallel in a portion of the Leeswood coal, North Wales, so far as regards the quantity and density of the gas it yields.

"Parrot" and "Cannel" may be considered as synonymous terms; the former seems to have been given as a name to gas-coal, owing to the circumstance of its making a noise, when burning, similar to the cackle of a parrot: and the latter—a provincialism for candle—is the name applied to the same kind of coal because of its burning with a flame, and in country places, and in farm houses near to the gas-coal collieries, it generally both serves the purpose and saves the expense of house candles.

Gas-coals are to be considered in two ways—as to how many cubic feet of gas per ton of coal can be obtained from them, and as to the quality or illuminating power of the gas. Quantity and quality, therefore, form two separate questions for the consideration of the producer and consumer, and these properties are in no degree more dependent upon each other as regards this article of commodity, than they are with respect to any other. Quantity is estimated in a general way from the amount of volatile matter which coal yields. The following is an extract from a table of analyses of various Scotch Cannels, made by Dr. Penny, of Glasgow, from which may be gathered some useful information respecting the relative composition of these coals:

Locality or Name of Coal.	Specific gravity.	Volatile matters. Per cent.	Fixed carbon. Per cent.	Ash. Per cent.	Sulphur. Per cent.	Water. Per cent.	Coke. Per cent.
Roch Soles, 1851,	1.448	53.7	4.9	38.8	1.6	1.0	43.7
Boghead, 1851,*	1.160	71.06	7.10	21.2	0.24	0.4	28.3
Boghead, 1851,†	1.218	62.7	9.25	26.5	0.35	1.2	35.75
Torbane Hill, 1853,	1.189	67.11	10 52	21.0	0.32	1.05	31.52
Boghead, 1849,	1.155	71.3	11.3	16.8	0 34	0.6	28.10
Battisville,	1.201	64.35	12.6	22.3	0.25	0.6	34.8
Methill,	1 300	49.23	17.57	29.7	—	3.5	47.27
Capeldrae,	1.360	45.73	19.97	31.5	—	2.8	51.47
Wemyss,	1.183	58.52	25.23	14.25	—	1.95	39.53
Lesmahago,‡	1 199	56.23	36 7	4.8	0.55	2.22	41.00
Lesmahago,§	1.228	49.34	40.97	6.34	1.35	2.0	47.31
Knight's Wood,	1.234	44.77	41.13	11.05	—	3.05	52.18
Cairnbroe,	1.247	42.83	42.67	8.5	—	6 0	51.17
Kelvinside,	1.231	40.17	53.42	1.9	0.21	4.3	55.32

The following are the quantities of gas in cubic feet per ton obtained from the principal British gas-coals:

		Cubic Feet per ton.
In Scotland—	Boghead	15,000
	Lesmahago	13,500
	Capeldrae	14,400
	Arniston	13,600
	Ramsey	10,300
	Wemyss	14,800
In England—	Pelton	11.000
	Pelton Cannel	11,500
	Leverson ditto	11,600
	Washington ditto	10,500
	Pelaw	11,000
	New Pelton	10,500
	Dean's Primrose	10,500
	Ponesfield	10,500
	Gosforth	10,000
	West Hartley	10,500
	Hasting's Hartley	10,300

The standard of comparison for the photogenic, or illuminating power of coal-gas has not always been the same. As the illuminating power of the gas depends upon the presence of the heavy carburets of hydrogen and the vapors of naphtha, and seeing that these subtances are condensible in anhydrous sulphuric acid, in bromine, and chlorine, the method of ascertaining the photogenic power suggested and practised by Mr. Henry, has been by finding what percentage of gas was condensible by bromine. A spermaceti candle, consuming 120 grains per hour, is now, however, generally adopted, and we are consequently in the habit of speaking about the light-giving power of gas as being equal to so many candles. According to this standard of comparison, the Boghead coal is about 37—that is, the illuminating power of its gas is equal to the light produced by 37 spermaceti candles, each consuming at the rate of 120 grains sperm to the hour Lesmahago is 27; Capeldrae, 19; Arniston, 22; Ramsey, 21; Wemyss, 24; Pelton, 14; Pelton Cannel, 18; Leverson Cannel, 18; Washington Cannel, 18; Pelaw, 12; New Pelton, 12; Dean's Primrose, 13; Ponesfield, 11; Gosforth, 12; West Hartley, 12; Hasting's Hartley, 12. According to Mr. James Lancaster, the Wigan Cannel of Ince Hall Colliery produces 11,000 cubic feet of gas per ton of coal, the illuminating power being equal to 24 candles; the Kirkless Hall produces 10,500 cubic feet per ton, the illuminating power being equal to 24 candles; the Haigh, or Balcarres Cannel, the same as the preceding; the Ince Hall Arley coal gives 9,000 cubic feet of gas, the lighting power being 20 to 22.—*London Min. Jour.*

* Brown. † Black. ‡ Auchinheath. § South Field.

A NEW METHOD OF GAS MANUFACTURE, AND A NEW GAS.

The following article, which possesses some interest to gas-experts, recently appeared in the columns of the New York *Tribune:*

Among the necessities of daily life there is, after those of air, food, and clothing, no other which is more generally and urgently felt than that of some form of artificial light. In the course of development of the means and modes of securing such light, the latest and highest result, as is well known, has been the manufacture of dry and permanent illuminating gases, and which are remarkably convenient alike of distribution and of use.

The general introduction of gas-lighting into cities, towns, &c., may be said to date from the first lighting in this manner of London and Westminster in the year 1809, from which time to 1823 the extension of the then new mode was very rapid. Thus, about fifty years have elapsed since the period when the manufacture of coal-gas for illuminating purposes must have been already brought to a certain degree of perfection as a working process. However strange the fact may appear, it is still a fact, that from that period to the present no great and important improvement—although there has been abundance of margin for such improvement, in the way of economizing materials and augmenting and cheapening the light—has been made in the business of gas-manufacture. Some fall in the price of gas has taken place; but it has been due to incidental causes, and in view of the real possibilities of the case, it is quite inadequate. Coal-gas, as now generally furnished to consumers, is still an article contaminated to a needless extent with impurities such as—communicated to the air of rooms in which it is burned—are deleterious to health; but secondly, it is comparatively a thin and poor gas, one that gives an unnecessarily feeble flame, and the light of which is not white, but yellow; and thirdly, at the rates ruling for the gas, the light so obtained is (in comparison with that which the same or equivalent materials could be made to afford) still excessive in price.

Prof. E. Frankland, in the recent *Supplement to Ure's Dictionary*—the authorities being the highest possible in the case—in speaking of the conditions under which the distilling of coal for gas is now carried on, says: "The natural consequence of those conditions is the production on the one hand of products resulting from excessive temperature, viz., *hydrogen* and *light carburetted hydrogen* [which thin or dilute the gas]; and on the other hand of *tar*, which may be regarded as the consequence of deficient heat," [and which, consisting itself almost wholly of the very best gas-material, amounts to just so much robbery in volume and lighting power from the total gas generated]; and the same authority immediately adds, "Notwithstanding several attempts, *these disadvantages have not yet been successfully overcome.*" Thus it is seen that the coal-gas manufacture of the day, in its hitherto best and most advanced form, is still continually tending to one or other of two narrow extremes, both wasteful; with too high heat it produces an excess of diluting ingredients, that thin the gas, though they increase its volume; with too low heat, it gives an excess of tar, thus losing light-material, and diminishing the volume of the gas.

It is, indeed, a well-known and undeniable fact, that the coal gas process is an exceedingly wasteful one Muspratt, in his *Chemistry Applied to the Arts*, &c, speaking of the unavoidable loss in tar that occurs in it, says: "The tar truly holds as much illuminating matter, or nearly so, as exists in the gas." But he proceeds to show that this estimate is based on the admission of an excess of the element *carbon* in the tar and other waste, and which it is certain that the common gas-process could in no case convert and utilize. In order that the practical bearings of the important fact just named, and also the grounds for the conclusions which are to follow, may clearly appear, a preliminary but condensed statement must here be made of some of the principles and facts pertaining to the chemistry of illuminating gases and gas-making:

1. In the use alike of candles, oils, and gases, the material at the moment of burning exists in the form of vapor or gas.

2. In the use of any of these, the brilliancy and power of the light obtained is wholly due to *carbon particles* furnished by such vapor or gas to the flame, and which become ignited and shine just before being oxidized and consumed.

3. The intensity or power of the light is exactly proportional to the number of carbon particles thus supplied to the flame, and that can be consumed in the flame by the *oxygen* which enters it from the surrounding air.

4. If the carbon in the flame be in excess over what the natural or artificial current of air can consume, the flame *smokes*—a result not only impairing the light, but attended with other inconveniences.

5. Carbon cannot by itself be brought to maintain the gas form; but by its combination in certain proportions with *hydrogen*, permanent gases suitable for illumination are obtained.

6. Thus, hydrogen is required, *first*, to gasify the carbon; *secondly*, to dilute it to the point at which it will burn without smoking. And a lighting gas needs to contain only these two elements.

7. Coal-gas universally contains a proportion of carbon much smaller than, by use of the ordinary burners, could be burned perfectly and without smoking. This fact explains the comparative feebleness of the light it affords.

8. The permanent hydrocarbon gases which most abound in carbon, and so are the most highly light giving, are two: *olefiant gas*, which if it could be burned pure without smoking, would give a light having several times the power of that from the present coal-gas; and the recently discovered *acetylene gas*, which, under the same supposition with that just made, has again double the lighting power of pure olefiant gas.

9. Acetylene gas, in a jet small enough to burn clear, affords the most intense light of which a hydrocarbon gas is capable; and the light is also perfect, *i. e.*, of a pure white.

10. It follows that the real *desideratum* in the way of an illuminating gas for general use, is a gas that shall be substantially composed of the component gases known as the *acetylene* and the *olefiant*, and one containing along with these no more of the diluents *light carburetted hydrogen* and free *hydrogen*, than is required to bring the entire gas to the point at which it burns clear, in the ordinary burners.

11. And from this, again, it follows that the process of making an illuminating gas should be one that is completely under the control of the manufacturer—one by which he can, at will, generate (if required) a wholly or mainly pure *acetylene* or *olefiant gas;* and by which he can so determine for other cases the entire percentage of hydrogen the total gas shall contain, that those richer gases shall be no further diluted than as above stated. And besides, such a gas process can only be considered as truly economical or highly perfect—in case of relying upon the crude material now in use, the *bituminous*, including the *cannel coals*—when it converts into such a gas as now described, the entire volatilazable portion of such crude material, leaving no waste.

12. Now, in coal-gases the presence of acetylene is uncertain, and its quantity never more than minute; and the proportion of olefiant gas also is small. The coal-gas process cannot be relied on to increase the production of acetylene, nor to any important extent that of olefiant gas. It is by no means a process under the control of the manufacturer, but, in fact, is in its very nature a self-limiting process; and as such cannot be brought to afford a gas of as high lighting power as is desirable, nor as the materials used could be made to furnish.

13. Finally, a method of gas-manufacture, to be in the highest sense economical and perfect, must be one that will by no means confine the manufacturer to the use of the bituminous coals; it must be one that will enable him to produce substantially the same illuminating gas, and that is at least equally rich in carbon from any one of a great variety of other materials, most of which abound quite as much in elements convertible into such gas as weight for weight does the best cannel coal, and some of them still more so; among the valuable materials of this nature being, not only coal-tar (so long as it shall be produced by certain works), but even *common tar, pitch, rosin*, certain sorts of *peat*, and all forms of *bitumen, asphaltum*, and *rock-oil*, or *petroleum;* as well as certain derivatives from these, among which are *naphtha, benzole, eupion, paraffine, kerosene*, the *heavy* or *dead oil* from petroleum, &c. It is well known that some of the materials now named are extremely abundant in certain extensive districts in both hemispheres, this being especially true of peat, bitumen, and petroleum, and in less degree of common tar. Where they are directly to be obtained, the cost of such material is merely nominal, and most of them may at no distant day be had at low rates in all parts of the civilized world.

Now, through a course of investigation for some time past carried on by Dr. Elmer, in respect to the nature of illuminating gases, the conditions under which they are produced, and the nature also of the many sources or materials from which it ought to be possible to obtain them, in combination with such aid as invention must be called on to afford, there has resulted the discovery of a substantially new method of gas-manufacture, and which has been brought into practical and working form; this method being one by the operation of which, and for the first time in the history of gas-lighting, all of the exceedingly important and valuable results above indicated as desirable are at length placed at the command of the gas-manufacturer, and that not only with certainty, but through employment of a highly simple form of apparatus.

The new method is based on a few simple principles and ideas, some of which have already been adverted to. It proceeds, in the outset, upon the general fact, that all the materials it is desirable to convert into illuminating gases have in them an *excess* of carbon over even the requirements of the richest gas that can be ordinarily burned—still more, over what the common or coal-gas process can convert. All those materials have in them *some hydrogen*, but none of them enough to render all their carbon available. In the first place, then, the new method claims from an extraneous source an abundant supply of the simple element hydrogen, adequate to the needs of any of the crude materials operated on; and it regulates this supply so as to afford to each of the sorts of materials just the percentage of hydrogen required, in view of its composition and that of the gas to be generated.

But this hydrogen must be had from some compound of which it previously formed a constituent; and to liberate it the utmost advantageously to the gas process, and also economically, it is necessary to decompose water (in the form of steam) by oxydizing some other element, the oxide of which should be solid, so as to be readily separated from the gas, and should, if possible, be such as will have a commercial value even greater than that of the auxiliary element or material, thus made necessary. And the demand for such an element is perfectly answered by the employment of the metal *zinc*, the oxide of which, known as "zinc white," and in good demand as a pigment, and which if obtained in impure state from the process can be very cheaply purified in large quantities, possesses a market value as a rule *one-third* higher than that of the metallic zinc, beside that during the oxydation it has gained also in weight. The generation of the gas in the new method is carried on at an intensely high heat, namely, *white heat;* and at this temperature, zinc in contact with steam, decomposes the latter with exceeding rapidity, becoming itself oxydized, and setting free, so long as its quantity and that of the steam suffices, large volumes of the elementary gas, hydrogen.

It is proper in this place to remark that the new gas process here described is, in the important particular just under consideration, wholly distinct from, as well as superior to, that originated many years since in England, to which have commonly been given the names of the "hydro-carbon gas," and also the "water-gas" process, and which has been more recently imitated in certain attempts at gas-making in this country. Thus, in the so called "water-gas" mode, the steam is invariably decomposed within the generating retorts, and not by a metal, which would *detain* the oxygen of the water, but by means of the coal or shales that are being distilled, or by means of wood or charcoal, and at all events, by *carbon* in some form; and the result is, that while the hydrogen of the water unites with a portion of the carbon of the materials, the oxygen unites at the same time with another portion; and a considerable proportion of *carbonic oxide* and *carbonic acid* gases are thus added to the total gas—

the latter compound being wholly worthless for light, the former nearly so, and the presence of both objectionable. It is an important feature of the new method that, by detaining and wholly removing the oxygen, it adds only pure and needful gas-material to the total volume of the gas which it produces.

The apparatus employed consists essentially of benches of retorts, set in masonry over furnaces, in a manner not greatly different from that in use for coal-gas. The chief distinctions are in the facts that the retorts are of fire-clay, to endure the intense heat necessary; that, as in the new mode is required, they are so placed as to be conveniently accessible at both extremities; that they may, if deemed desirable, be in two sets—an upper set of "*decomposing-retorts*," and pass only hydrogen gas to the next set—this, the lower, being in all cases the set of "*generating-retorts*," or those within which the illuminating gas is produced; and finally, of course, that in addition to the retorts there is a boiler so placed as to receive heat from the furnaces, and the steam formed within which is here caused to flow on its way to the retorts through a coil of pipe, so as to become superheated, and thus to obviate as far as possible its lowering effect upon the temperature within the retorts. From one end of the generating retorts, ascension pipes rise, as in the common method, into a hydraulic main, from which the gas is further passed, as usual, through the requisite condensers, purifiers, &c., to the gas-holder.

Whatever materials are distilled for illuminating gas, the zinc is, when the retorts are sufficiently heated, introduced in charges of suitable quantity, and after a due length of time the oxide is withdrawn, much as is the coke in the old process, to be replaced by a new charge. In cases where the entire process is completed within the generating retorts, the preparatory introduction of the zinc is into these; in other cases, it is into the separate decomposing retorts. If the crude materials operated on be bituminous coals or shales, or peat, these also must be introduced in charges, in a manner somewhat similar to that now adopted with coal, and of course into the generating retorts; at the end of a proper period, the coke and other inconvertible solid residue being in like manner withdrawn. But just here comes into play the important distinctive feature of the new method, namely: that the additional volume or percentage of the simple gas, *hydrogen*, required—and that alike is set free in the upper or the lower set of retorts—being continually intermixed, and at or near the moment of its liberation, with the volatilized or vaporized bituminous matters of the coal, shales, or peat, and being thus intermixed with the tar-vapors as well as the others, and even (if any of this could be supposed in such circumstances to form) with such fine carbon or soot as in other gas—methods would fall as a residue in the retorts, the results are, that—under the intense heat acting—the supplementary and nascent hydrogen, its quantity being *sufficient* for the purpose, so enters into actual combination with all the various gasifiable matters that are present, and that have now just been named, that the entire weight and volume of these are converted into a corresponding volume of permanent illuminating gas or gases; and the quantity of hydrogen discharged into or set free within the generating retorts being properly *regulated*, the total volume of illuminating gas so generated can be made such as shall hold in combination any desired per centage of carbon, and hence, as shall possess any required degree of lighting power. Accordingly, after the proper exhaustion of any charge of crude materials such as above named, there will remain in the generating retorts only such residues as coke and earthy matters; and from the very nature of the process, the coke will necessarily be somewhat less in quantity than would be obtained under the now usual or coal-gas method. Meantime, the abundant material which, in the last named method, passes over as *tar*, and as "*drips*"—these latter consisting chiefly of coal-oil—and that also which is there liable to remain as *soot* in the retorts, has been, in course of the new process which we are now considering, converted into illuminating gas. And finally, the total gas product thus obtained from any charge of crude materials, besides possessing a higher lighting power, is also of much larger volume than the best results possible under the ordinary or coal-gas method can furnish.

The fact last stated is fully accounted for, when we consider the enormous waste of illuminating material necessarily occurring in the coal-gas process. The average total amount of waste per ton of coal distilled in the ordinary method—and in this estimate we of course reject the impure ammoniacal water also passing over, and speak of the tar and coal oils only—is certainly not less than 20, and probably not less than 25 gallons; and all this is intrinsically the best gas material. Muspratt practically admits that, in spite of the supposed excess of carbon, the waste would make nearly as much more, and of an equally good gas as the volume now in fact produced. But the new process, by supplying additional hydrogen, converts also the excess of carbon. And by an admission which Muspratt himself subsequently makes, in doing this it really converts into illuminating gas nearly *twice* as much material in addition as the common method does in all; and hence, from a given charge of coal, though not perhaps so nearly three times *the volume*, certainly furnishes not much less than three times the *illuminating material* and *light-giving power*, as compared with that previously secured.

Some help toward appreciating the immense saving thus effected, and the consequent value of the now method, may be afforded in the simple statement of the fact that the quantity of bituminous coals distilled for gas in one year in the various gas-works now in operation for supplying the single city of New York—taking its limits precisely, that is, as those of Manhattan Island—is not less than from 135,000 to 140,000 tuns. Then, let it be remembered, that from *every tun* of the coals so distilled, there is at present rejected as worthless, or nearly so, and at all events impracticable of conversion by the process in use into gas, the amount of from 20 to 25 gallons of liquid and semi-fluid hydrocarbon material, a portion of which is simply allowed to run into the sewers, and thence into the rivers surrounding the city, while the remainder is sold at cheap rates for purposes which could as well be served by common tar and asphaltum! And finally, to complete the picture of loss and wastefulness exhibited hitherto in the business of gas-making, and in the respect now under consideration, it is necessary to find, or to imagine how many times greater is the entire quantity of coals distilled for illuminating gases in all the cities, towns and other situations of its use throughout the civilized countries of the globe, than is the total number of tuns already stated as the yearly consumption in the city of New York, and to multiply the last named quantity by the number expressing that ratio!

Thus far, the manufacture of illuminating gas by the new method, has here been considered only in reference to the bituminous coals and shales, and peat. But it was previously rendered avident that the method is as effectually applied also to all such crude materials as *pitch*, *rosin*, *bitumen*, *asphaltum*, *petroleum*, *naphtha*, *benzole*, the refuse of *heavy oil* from petroleum, &c. Indeed, with most of these, the process is even more simple and convenient than with the permanently solid bituminous materials previously treated of. This is so, in view of the facts that the hydro-carbon bodies just named, and now to be considered, are either naturally fluid, as is true of *petroleum*, *naphtha*, &c.; or else they are by heat, or by dissolving in naphtha, readily brought into the fluid form, this being true of *rosin*, all forms of *bitumen*, &c.; and that, as a consequence, all these materials can be, by use of a suitable syphon arrangement, fed in small and regulated streams, as required, into the generating retorts, and at the same time, with the admission also of corresponding regulated streams of steam or hydrogen. In this way the generation of illuminating gas goes on continuously within the retorts, the streams of admitted material at once undergoing transformation into such gas, and the latter escaping as fast as formed through the hydraulic main to the holder. And, of course, by properly regulating the quantities of the materials, that is, both of the crude hydro carbon operated on, and the added hydrogen, the gas generated is made to have any density and lighting poer required, from that of pure *acetylene* down to *olefiant gas*, or to a mixture slightly less carburetted than the latter, and which is as rich in carbon as can be ordinarily burned. With the use of all these materials, the final residue in the generating retorts is simply the small percentage of earthy matter they contained, and the retorts accordingly require but seldom to be opened for cleaning.

A very great practical advantage of the new gas method, will be seen to consist in the fact of its being equally adapted to any of the great variety of valuable hydro-carbon materials which the coal-gas process cannot convert; and as a consequence of which it can be employed to operate upon any of those materials that may be found most accessible or otherwise desirable, according to the localities in which each is naturally abundant, or most cheaply to be procured. Thus, for cities, villages, or establishments in or near to districts affording the rock oil, or where it or its derivatives, are the most cheaply obtained, such materials can be those adopted for the gas manufacture; and so, in like manner, if the vicinities in which *peat* is easy of access, *asphaltum*, or in the absence of all these, even *common tar* and *rosin*.

It should further be added that the simplicity of the apparatus, and mode of its use, allows of its being constructed in very small and compact form, as may be required for the wants of factories, steamships, hotels, &c.

An apparatus, which is identical with that now described, and by actual and repeated experiments with which the results in the way of quantity and quality of illuminating gas produced, and of the prevention of waste by converting the total gasifiable matters of the crude materials operated on, as above described and claimed, have been actually demonstrated, is now in operation in the city of New York; and those who may be interested in the new method of gas manufacture, and may desire to witness the power and quality of the light afforded by the gas which is generated by the process, can at any time have the opportunity of so doing.

In respect to the volume of gas obtained from a given quantity of the different materials used, and the comparative light-giving power of the gas, as determined by the employment of photometric tests, a more full and specific statement than can here be given is now in course of preparation. It may suffice here to say, upon the former point, that by the theory of the process, the volume of the gas must be, for the density it possesses, as great as the materials are capable of affording. In respect to the light-giving power, Mr. A. L. Bogart, of this city, made, among others, a series of experiments upon a supply of the gas produced in accordance with the new method, early in August of the present year, testing the light of this gas against that afforded by the coal-gas delivered to consumers at the time by the "Manhattan Gas-Works" of the city, and the two varieties of gas, being of course burned from testing (argand) burners of the same capacity, and under the same pressure. In the use of burners known as "*one and a half feet fishtail*," the lighting power of the new gas compared with that of the coal-gas, is as *three and a half to one*; but the quantities of the two gases consumed in equal times being in the ratio of 1.632 to 2.340 cubic feet, and a reduction being made for this difference in the rate of consumption, it was found that the total light-giving power of equal volumes, of the two gases, was in favor of the new gas in the ratio of 5 9-500 to 1. With larger burners, as those known as "*three feet*," and over, the difference in favor of the new gas was somewhat less. But the greater density of the new gas in fact serves to render desirable the use of burners somewhat smaller than those now commonly employed, since, volume for volume, a denser gas burns longer than a rarer one, that is, the former possesses a higher rate of "*endurance*;" and the change to burners of less size accords with this fact, and secures a given maximum of light with the least possible consumption of the material.

In burning the gas generated by the new method, a marked difference and superiority in its flame and light over those afforded by the ordinary coal-gas, are at once observed. The flame is not a comparatively thin or pale one, as is that of the common gas, but is in fact an exceedingly *dense* or *solid* one. The light, as already shown, in speaking of the photometric tests of its power, is proportionally strong, or intense; and this fact is not merely obvious to direct observation, but also upon employment of the light for reading or otherwise. Further than this, the light is one in a remarkable degree *white*; so that it casts upon all objects

which it illuminates, a mixture of rays more complete, or as a whole perfect, than is the case with the light of the coal-gas now in use, and in which the yellow rays decidedly predominate. By the light of coal-gas, it is difficult to distinguish *white* from *yellow;* and also to distinguish nearly allied hues or the lighter colors, as yellow, orange, and green; while such light falling upon such colors as blue, violet and purple, has the effect to change or disguise them. The highly white light of the new gas, however, containing within it more nearly all the rays of the sunbeam, replaces, in corresponding degree, the light of day, and accordingly shows much more naturally and perfectly all colors whatever upon which it falls. In view of the valuable quality of whiteness possessed by its light, the new gas may properly be known as the Albilucent Gas [*albus*, white, *lucens*, *shining*.]

It is quite certain that, by a proper selection of materials, the new gas will be in the outset obtained in a state of greater purity than is the present coal-gas; while, so far as impurities must result through the very nature of the materials, in any gas generated from them, it is proposed to employ the most thorough of all means known to effect their removal, so that the consumption of the gas shall, beyond the unavoidable *carbonic acid*, impart little or nothing of a deleterious character to the air where the light is used. The intensely high heat of the new process, and the very low back-pressure from the holder that will be maintained, with ordinary care in obtaining tight joints and connections, will also (it is believed) suffice to prevent altogether any leakage of offensive volatile matters, or of the gas itself from the works; and thus will be obviated one serious objection to the presence of such works in any vicinity, and even to the introduction of the works, on a small scale, for establishments such as hotels and factories, and in steam vessels.

Finally, after what has been said of the economy of the materials used, and (through incidental production of "zinc white") of the process itself, it is scarcely necessary to say that the new gas can be afforded upon terms which will effect a great saving to consumers—and that, in fact, it will be a much cheaper lighting material than any gas heretofore produced.

In view of facts, such as now stated, it is evident that the introduction of the gas produced by the new method, must effect a decided revolution and a marked advance in the whole system of gas-lighting. Sir William Armstrong, President of the "British Association for the Advancement of Science," in his introductory discourse before that body, at its meeting in August of the present year, mentioned the recent discovery by Berthelot of the new permanent hydro-carbon gas, *acetylene*, and stated some of the circumstances under which it was already known to be generated. And he then added:

"There is now every reason to believe that the new gas *will become practically available for illuminating purposes.* Thus it is, *that discoveries which in the first instance interest the philosopher only, almost invariably initiate a rapid series of steps leading to results of great practical importance to mankind.*"

Now it is certainly a fact well worthy of remark, that the important results which Sir William Armstrong thus so truly indicated, and which he appeared to foretell, had even then—by the discovery and demonstration of a method by which either *acetylene* or gases having lower degrees of lighting power, can, at will, be generated—been already accomplished, and that upon this side of the Atlantic, by Dr. W. Elmer, to whom we are indebted for these valuable discoveries.

New York, Oct. 24, 1863.

Levi Reuben, M. D.

New English Gas Patent.—F. M. Parkes, of Plumstead, Kent, England, has lately patented a process for making gas "by passing the product known as water-gas (generated by the action of steam upon red hot coke) through a second retort or apparatus, in which rock oil or petroleum is decomposed by heat."

Mr. Parkes has here secured an old and worn-out invention, which has been used over and over again. There is no novelty whatever in it, and he will find that if he ever attempts to put it into operation, he will have to encounter litigation from other patentees, who have secured the same invention.

ILLUMINATING GAS.

BY PROFESSOR H. DUSSAUCE.

In the year 1664 Dr. Clayton made the observation that combustible illuminating gas was produced during the decomposition of coal by heat, and that this could be collected. One hundred years afterwards application was made of the fact. Lord Dundonald built some coke furnaces in 1786, and amused himself by collecting the evolved gas in tubes and burning them, but without any definite object. Since the year 1792, another Englishman of the name of Murdock, to whom we are indebted for the invention of the useful application of gas, occupied himself incessantly with experiments, up to the year 1796, which were crowned, in 1798, by the erection of the gas-works for illuminating the factory of Boulton and Watt.

Independently, and about the same time, Le Bon, a Frenchman, succeeded in illuminating his house, which was warmed by the same means, thermo-lamp, by an apparatus in which he evolved gas from wood.

Gas was employed by Windsor for street illumination in 1812, in London, and 1815, in Paris. Oil gas was first prepared on a large scale, by Taylor, in 1815.

Illuminating gas occurs in nature, and not very rarely, but it is not of such good quality as that artificially produced. It has always been observed where matter of organic origin, contained in rocks, is undergoing gradual decomposition. The celebrated holy fire at Baku, on the Caspian sea, is due to the ignition of a gas which issues from the earth, and which Hesz has shown to be light carburetted hydrogen, with some naphtha vapors. It contained 77.5 carbon to 22.5 hydrogen. In New York State they have gone still further; the practical tact of the Americans has already made use for industrial purposes, of similar sources of gas, at Fredonia, on Lake Erie. The gas is there collected in gasometers and used for illumination.

The burning fountain of Dauphine is of like origin; but the soil of Italy, particularly in the neighborhood of the Appenines, is remarkably rich in such phenomena. Pietra Mala, Barigazzo, Bologna, and Parma are the chief localities of this kind. Phenomena of a similar nature occur in the Cordilleras, Hungary, Greece, England and other countries.—*Industrial Chemist.*

The "Warrior" Lighted with Gas.—The London *Times* says that the celebrated frigate *Warrior*, which is undergoing a thorough overhauling in the dock at Portsmouth, is to be lighted with gas. From the description below, it would seem to be merely naphthalized air, which the *Times* calls "ozone gas:"—"Perhaps the one possessing the greatest novelty is the introduction of ozone gas into the engine room and screw alley. Two small copper reservoirs, holding about a quart imperial measure each, contain a supply of spirituous oil, which flows by a pipe, after the manner of a caged bird's water fountain, into a small copper-inclosed tray filled with sponge. Through this a stream of atmospheric air is blown by a pipe from a pump (the latter set in motion by a weight and pully), which, passing out by a discharge pipe at the opposite end of the tray, goes direct to the burners. There it gives out a beautiful white light, with comparatively no heat. An apparatus for the supply of a dozen burners may be carried under the arm. It requires no gasometer, and its use entails no danger to the ship. It emits no smell when burning, nor does the vapor itself, when allowed to escape unburnt from the nozzle of the burner. Its use entails no attention beyond the winding up, once in 24 hours, of the small weight which sets the machinery of the air-pump in motion. Its cost is one-fourth that of the candles served out for use from the paymaster's stores of the ship."

Substitute for Coal.—It is estimated that the asphalte lake of Trinidad, is capable of producing 300,000,000 gallons of oil, 40 or 50 of which are equal to one ton of coal. It is proposed to use this for fuel for ocean steamers.

Quality of London Gas.—Dr. Vinen reports that the average illuminating power of the gas made by the Surrey Consumers' Company for the fortnight ending October 17, was 12.90 candles. The gas contained one per cent. of carbonic acid, but not a trace of either sulphuretted hydrogen or ammonia.

Advance in the Price of Gas.—The present high price of coal, labor and everything entering into the requirements of gas-works, has caused advances in the price of gas in several places. In our last issue we noted the fact that at Philadelphia the price had been raised to $2 50 per thousand cubic feet.

The Citizens' Gas Company, of Brooklyn, have raised their price from $2 50 to $3 00 per thousand.

At Camden, N. J., opposite Philadelphia, the price has been raised from $3 50 to $3 85 per thousand cubic feet.

We have heard rumors to the effect that the Metropolitan and Manhattan Gas Companies, of this city, intend to add the excise tax—15 cents per thousand—to their bills.

Gas in Scotland.—At Edinburgh, the quality of the gas supplied during the month of October was very good. Its average illuminating power was equal to 31.30 sperm candles, each consuming at the rate of 120 grains per hour. The gas was free from sulphur. On two occasions it was slightly, and on two other occasions, deeply tinged with ammonia.

Lime Purification.—The chemical composition of lime used in purifying gas may vary to such an extent as to give very unequal results. Limestone always contains impurities and foreign ingredients, and sometimes these exist in such large proportions as to impair its purifying power to a great extent. Engineers should ascertain the quality of lime before buying it, or they may purchase an article which may give them much trouble and show some irregular results in the purifying house.

PATENTS.

UNITED STATES.

40,594.—James S. & T. B. Atterbury, Pittsburgh, Pa., for a Lantern:

We claim a metal plate reflector in combination with a lantern-globe, substantially in the manner and for the purpose set forth.

40,620.—Charles M. Halsted, Troy, N. Y., for a Filter:

I claim a water filter having an upper chamber, G, intermediate chamber, H, lower chamber, I, wire sieve or strainer, C, cup, F, supports, b b, cloth sieve or strainer, e, supports, a a, the whole being arranged and combined, substantially as and for the purposes herein described and set forth.

40,602.—Frederick William Brocksieher, Bridgeport, Conn., for a Gas Regulator:

I claim the arrangement and application of the regulating screw, A, or its equivalent, in combination with the elastic diaphragm, C, and valve, D, in the manner and for the purpose substantially as herein set forth and described.

40,612.—M. Decamp, South Bend, Ind., for a Water Wheel:

I claim, first, The ring, E, placed on the bed-piece, d, in which the shaft, D, is stepped and fitted in the lower rim, a, of the wheel, C, substantially as and for the purpose specified.

Second, The conical or funnel-shaped ring, F, fitted in the circular opening, h, in the decking or planking, B, and within the upper rim, a, of the wheel, substantially as and for the purpose set forth.

40,617.—Warren L. Fish, Newark, N. J., for Attachments to Lamps and Gas Burners for holding Vessels or Shades over the Flame:

I claim, first, The combination of a support for sustaining vessels to be heated or other articles with a standard rod and adjustable clamp, in such a manner that it may be attached to any convenient part of a lamp or burner, and when so attached, shall hold the said vessel or article in a position immediately over the flame, substantially as herein described.

Second, The combination with the support and suitable clamping device of an extension standard rod, adjustable substantially as herein described.

40,632.—Charles Lockhart and John Gracie, Pittsburgh, Pa., for a Still for Petroleum, &c.:

I claim the combination with the goose-neck, C, of the horizontal or lower pipe, D, and valves E E, in the manner herein shown and described.

Second, The combination of the curved hinged plates, I, and attached scrapers, d, with the shaft, F, and bottom, a, in the manner herein shown and described.

40,637.—Hiram Nash, Pittsfield, Mass., for a Water Elevator:

I claim, first, The cross bar, G, provided with blocks, e e, or their equivalent, having double bearings, f f, when said cross bar is used in combination with the heads, a' a', of the windlass, for throwing the bucket outward, in either position it may come up, substantially as herein set forth.

Second, In combination with the cross-bar thus arranged and provided with the arm, l, and cross-head, K, I also claim the double rods, d d', and valves, H H', for adapting the discharge to either side of the bucket that may come outward, substantially as herein set forth.

Third, I also claim the double spout, I I', in combination with the valves, H H', situated respectively over each spout, and operated automatically, in such a manner that while one allows the discharge of water at the proper position, the other shuts it off, substantially as herein described.

Fourth, I also claim the arrangement and combination of the cross-bar, G, double rods, d d', valves, H H', and double spout, I I', substantially as specified.

Fifth, I also claim, in combination with a bucket provided with the double spout, I I', and valves, H H', the two branch cords or chains, b b, connected with the single cord or chain, F, in such a manner that, when the bucket is fully raised, one end or the other of the said spout will come in coincidence with the curb spout, substantially as herein set forth.

Sixth, In combination with the bucket thus connected with the windlass, I also claim the guides, K K, for centering the bucket, substantially as described

Seventh, I also claim the combination of the brake, M, lever, L, pawl, D, ratchet wheel, C, and head, a', or equivalent, of the windlass, whereby, when the brake is applied, the pawl is disengaged automatically, and *vice versa*, substantially as described.

Eighth, I also claim the loose winch, E, ratchet disk, Q, and pivoted latch, P, when used in combination with the windlass, B, and a bucket provided with the double spout, I I', and valves, H H', substantially as specified.

Ninth, I also claim the arrangement of the brake, M, lever, L, pawl, D, ratchet wheel, C, winch, E, ratchet disk, Q, and pivoted latch, P, substantially as herein described.

40,660.—A. H. Knapp, Newton Center, Mass., assignor to J. A. Locke, S. G. B. Coombs and D. H. Priest, for a Rotary Pump:

I claim the piston and revolving butment rotary pump, the employment of gearing cogs, m m and n n, respectively upon the intermediate portions of the peripheries of the piston wheel and butment, alternating in action, and in combination with the pistons and their concavities, substantially as and for the purpose herein specified.

I also claim the water chambers, G T, in the end of the pump case, separate from and opposite to the piston chamber and butment recess, substantially as and for the purpose herein set forth.

I also claim the arrangement of the inlet and outlet apertures, P Q, at nearly equal hights, and near each other, in combination with the pistons and abutment, substantially as and for the purposes herein specified.

I also claim, in combination with the piston and revolving butment rotary pump herein described, the drain aperture, j, passage, k, and cock, K, substantially as and for the purpose set forth.

40,704.—Freeman Morse, Hastings, N. Y., for a Water Wheel:

I claim a water wheel having buckets formed upon it in the manner described and extending from the top to the bottom of the penstock in which it is fitted to run, in combination with the penstock when the floor of the same is level with the bottom of the inlet and water-way, so that the water shall strike the buckets of the wheel and expend a portion of its force before commencing to rise in the penstock, as and for the purpose specified.

40,708.—J. H. Plank, Pulaski, Iowa, for a Pump:

I claim the levers, C and C', of the first and second order respectively, fulcrumed to posts, D D, and connected together by a pin, a, and slot, b, in combination with the rods, E E, and plungers, B B', when arranged to operate in the manner and for the purpose described.

40,719.—G. W. White, Monroeton, Pa., for a Water Wheel:

I claim, first, Constructing the buckets, d, of the wheel so as to have two inclined surfaces, 1 2, to form a concave or V-shaped face, and having lips, f, at their outer edges, as and for the purpose specified.

Second, Placing the wheel, F, in the lower part of a case, B, which is inserted in the pan-stock, A, in connection with the open top of the wheel, whereby the water is allowed to pass directly from the penstock to the wheel and the water after acting upon the wheel allowed, in case of back-water, to pass over the top of the wheel as set forth,

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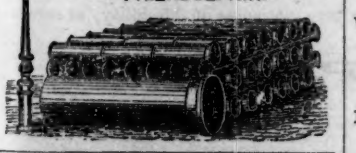

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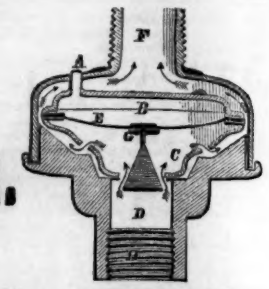

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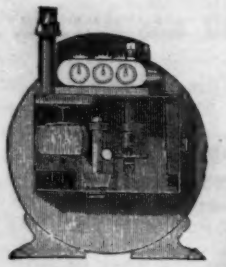

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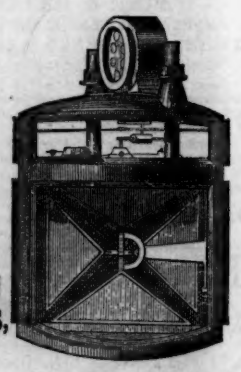

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ROBBINS' PATENT WATER, GAS & STEAM JOINT.

THE PROPRIETORS of this unrivalled joint are now prepared to introduce it to general use, and to guarantee that, in all respects, it will fulfil perfectly all the requirements of either water, gas, or steam. It is a joint which remains in all situations absolutely tight.

The following illustrations, with the appended explanations, will give a good idea of the improvement:

Fig. 3.

Fig. 1.

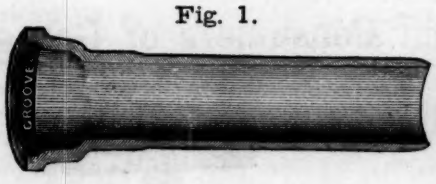

Fig. 2.

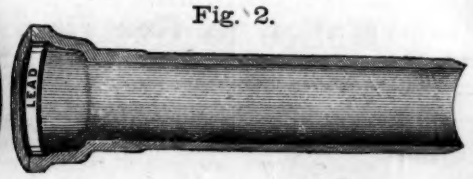

Fig. 4.

FIG. 1. Is a sectional view of a pipe showing a groove to receive a lead ring.

FIG. 2. Is a sectional view of a pipe showing a lead ring in the groove.

FIG. 3. Represents a former, which is used in the bell end of the pipe while casting the lead ring. Before using the former, however, a strip or belt of India rubber is first inserted in the socket, against which the former rests to prevent the lead escaping from the groove while being cast. Upon the cooling of the lead, the former and rubber ring are withdrawn from the socket, and the lead ring is left projecting inwards from the groove all around, forming an indestructible packing to receive the spigot-end of the pipe.

FIG. 4. Shows two pieces of pipe in connection with an hydraulic jack, by which the spigot-end of the pipe (which is cast tapering and may be cast in a chill), is forced into the lead ring in the groove which perfects the joint. A, represents the jack; B, B, the chains by which the pipes are drawn together; and C, C, pieces of pipe.

This ring joint packing may be cast at the foundry or any convenient place, and when delivered at the ditch, may be laid, and perfect joints formed, by any laborer, above or below the surface, or in ditches filled with water, there being *no joint ditching required*, and it can be laid with very great rapidity.

Among the economies realized by this joint may be enumerated, the saving in the weight of the pipe, in the amount of lead required to be used in forming the packing, in the labor of ditching, and in laying the pipe.

The bell or socket may be cast one-half the usual length, as the width of the groove requires, but from a half to one and a half inches, according to the size of the pipe, thus saving in the total weight about two hundred pounds per ton.

The weight of lead required to form this joint, as compared with the amount of lead used in forming a joint according to the old method, is fully seventy-five per cent. less, only so much being required as to maintain the compensating principle, or enough to allow (upon the raising or depressing of the line of pipe out of a direct line) what is lost upon one side of the ring packing, to take its place upon the other; thus securing flexibility of the joint without affecting its reliability. The use of yarn or hemp packing is dispensed with, the cost of which is an entire saving as compared with the old method of making joints.

The saving of labor in ditching is the total amount usually expended in digging joint-holes, there being *no joints to be caulked.*

The saving in labor in laying pipe furnished with this joint is a sum equal to the whole cost of carrying lead, fuel, ladles to the ditches, casting the lead, bailing out water, and the entire labor of caulking, less only the sum charged for casting the lead ring packing at the foundry, which is comparatively trifling. This last-mentioned economy has been estimated by the best engineers at seventy-five per cent., or the same as the saving in the quantity of lead used.

* The cost of pipe cast from our patterns is the same per ton as pipe cast for the old form of joint. The principal iron-founders propose to charge the same price.

We have submitted these joints in water-pipes to a pressure of two hundred and fifty pounds to the square inch, and they have remained perfectly tight. It has also been submitted for months in gas-pipes to the ordinary pressure of our city gas-mains, without any leakage whatever. We are aware that these statements may be deemed by many extravagant, but the merits of the improvement warrant them all, and the most skeptical may be fully convinced by an investigation of its value, and by witnessing the tests to which we submit it, or by its use under any conceivable circumstances.

TESTIMONIALS.

OFFICE OF THE WATER COMMISSIONERS,
CITY HALL, JERSEY CITY, October 14th, 1863.

Dear Sir,—On the 26th of May last, about two hundred and sixty feet of cast-iron water-pipes, six inches in diameter, with joints constructed according to your invention, were laid for the Jersey City Water-Works, in Prospect street.

The operation of uniting the joints of the pipes, was performed with remarkable facility, and with an important saving in time, materials, and labor. The joints proved perfectly water-tight, after turning the full head of water on the pipes.

In my opinion, your invention has proved entirely successful, and will be found highly beneficial to water companies.

Yours, respectfully,
ROBT. C. BACOT,
Superintendent and Engineer, Jersey City Water-Works.

MR. R. C. ROBBINS.

ENGINEER'S OFFICE, CROTON AQUEDUCT DEPARTMENT.

Dear Sir,—I have examined your plan for making joints in cast-iron water pipes, and have a report from one of my assistants, of certain experiments made by you, to prove the certainty and economy with which the joints can be made, and their stability when finished.

I think the experiments showed that the joints could be made quite as rapidly, if not more rapidly, than those made in the ordinary method now in use; the quantity of lead used was less than that required in the common joint, and no yarn packing was required. In these respects, your joint seems superior.

After the joints were made, a pressure of three hundred pounds to the square inch, was put upon the pipe in such a manner as to test the efficiency of the joint to prevent both leakage of water, and separation of the pipes from each other longitudinally. This pressure failed to produce either leakage at the joint, or separation, so long as the pipes lay in a direct line; but on deflecting them six and a half inches, in a length of twelve feet, the joint commenced leaking. It is fair to add, that this is a greater deflection than would often be found necessary in laying pipe.

I think the efficiency of the joint in both the points tested in this last experiment, might be increased by increasing the quantity of lead, both in thickness and width.

Altogether, the result of the experiments was such that I have determined to make a more thorough test of your invention by putting down about one thousand feet of pipe, when we commence our operations for the coming season.

The diameter of the pipe subjected to experiment, was six inches, and is the same size that I propose to put down next year.

I am, very respectfully, your obedient servant,
A. W. CRAVEN, Chief Engineer, &c.

To R. C. ROBBINS, Esq., Jersey City.

METROPOLITAN GAS-WORKS,
ENGINEER'S OFFICE, NAW YORK, October 9th, 1863.

Dear Sir,—The undersigned had the pleasure of being present at an experimental test of your patent joint for gas and water pipe, made at the yard of the Croton Aqueduct Department, and cheerfully testify to the results obtained, namely:

First experiment was made with two lengths of eight-inch pipe, jointed together, when a pressure of three hundred pounds to the square inch was applied. This pressure did not force the pipe apart, nor start the joints, but they remained, during this experiment, perfectly tight.

Second experiment was made by deflecting the pipe five inches, which is about equal to eighteen inches in one hundred feet, and the same pressure applied, which caused a small leak at the joints.

Third experiment was made by taking the pipes apart and rejointing them, when the same pressure was applied when lying straight and when deflected; at this experiment there was no leakage.

From these severe tests it is my impression that the superiority of your patent joint has been made manifest, and that it must eventually supersede the old way of jointing pipes together, saving both time and material.

Wishing you success in your enterprise,
I am, very respectfully, yours, &c.,
To R. C. ROBBINS, Esq. AMBROSE J. WHITE, Engineer.

OFFICE OF THE METROPOLITAN GAS-LIGHT COMPANY,
NEW YORK, October 9th, 1863.

Dear Sir,—Having been present at the testing of your patent joint for gas and water pipe, at the yard of the Croton Aqueduct Department, I can testify to the results as stated by Col. A. J. White, and fully concur with him in the opinion expressed in his letter to you of this date.

Very respectfully, yours,
R. C. ROBBINS, Esq. W. TITUS, Secretary.

NEW YORK, October 23d, 1863.

Gentlemen,—I am pleased to be able to inform you, that we are fully satisfied that we have done well in adopting your "Improved Joint," in the construction of an aqueduct which we are now building on Oil Creek, Northwestern Pennsylvania.

We have ten miles of three and four inch pipe to lay this season, and, in our estimation, the perfection of the joint, economy in lead, and rapidity with which the pipe can be laid, render it entirely preferable to any other method of laying pipe.

Our Mr. Hutchings advises us that he is putting down the three and four inch pipe at the rate of twenty-five to thirty lengths per hour, with two men in the trench. We are much pleased with this result.

Respectfully yours,
Messrs. R. C. ROBBINS & Co. HUTCHINGS & FOSTER.

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It consists of seventy-two parts Oxide of Iron, and twenty-eight parts Cement Lime Stone in the one hundred pounds.

It has much more body than red or white lead. It is warranted perfectly water and fire-proof and to withstand a greater heat on metals, without scaling, than any other paint in use.

It is a perfect cover for all kinds of iron, tin, or wood-work, out-houses, and canvas coverings. It prevents and arrests the corrosion of metals, and is not affected by the action of salt, gases, acids or ammonia.

It hardens under water, as has been fully demonstrated by its application to gas-holders, by many of the largest gas companies in the United States; which companies having thoroughly tested its properties as herein claimed, pronounce in its favor over any other paints in the market, even though sold at double its price.

As a coating for patterns of iron or wood, when mixed with shellac, it is much superior to beeswax, oil, or shellac alone, as has been proven at the large founderies in the country.

For patching boilers and making joints, it is considered superior to red lead, or any other preparation.

For cleaning metals it takes the place of crocus, rouge, and emery, being better and cheaper.

This Paint requires no more oil than dry lead or zinc, and much less than the ordinary mineral paints. It is free from any waste, and possesses a spreading and covering power unequaled.

Terms, by the Barrel or Half Barrel, Four Cents per Pound.

A liberal discount made to parties purchasing by the ton.

A Barrel or Ton will be forwarded to any gas companies desirous of testing its qualities, for which there will be no charge if it does not give entire satisfaction as being the cheapest and most durable of all other Paints in the market.

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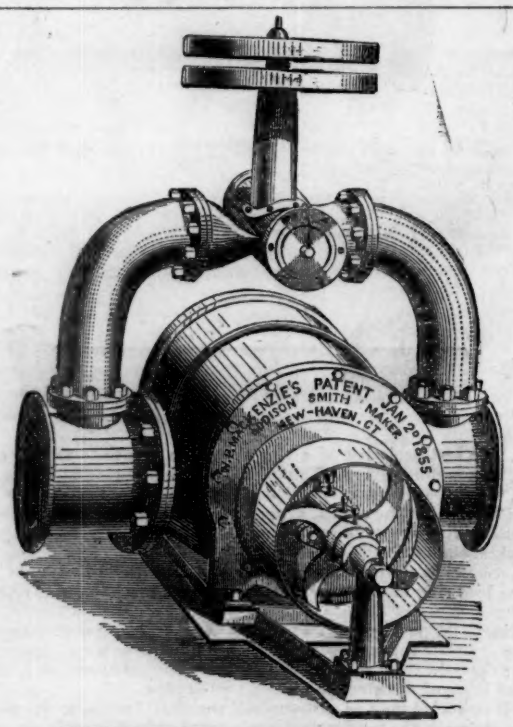

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The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary Fan. The Cupolas are manufactured in sizes to melt from 1 ton to 20 tons per hour, will save one quarter of the time required by the old style Cupola, and 33 per cent. uel Address SMITH & SAYRE, 458 Broadway, New York.

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